

Project No.: 9703

181581



Site Operations Plan (SOP): Work Plan and Health and Safety Plan

**Cornell-Dubilier Electronics Site
333 Hamilton Boulevard
South Plainfield, New Jersey**

May 2, 1997

submitted to

**U.S. Environmental Protection Agency
Region II
2890 Woodbridge Avenue
Edison, New Jersey 08837**

prepared for

**DSC of Newark Enterprises, Inc.
70 Blanchard Street
Newark, New Jersey 07105**

prepared by



OXFORD ENVIRONMENTAL, INC.

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May 2, 1997

U.S. Environmental Protection Agency, Region II
Removal Action Branch
2790 Woodbridge Avenue
Edison, NJ 08837

Attn: Mr. Eric Wilson, On-Scene Coordinator

Re: **Site Operations Plan**
Cornell-Dubilier Electronics Site
South Plainfield, New Jersey
EPA Order Index No. II-CERCLA-97-109

Dear Mr. Wilson:

Oxford Environmental, Inc. (Oxford) has been retained by DSC of Newark Enterprises, Inc. to provide environmental engineering and consulting services for the above reference site. We respectfully submit the attached Site Operations Plan submittal in accordance with the the Administrative Order, dated March 25, 1997.

The Site Operations Plan, hereinafter "SOP," consists of two sections: Section 1.0 - Site Work Plan; and Section 2.0 - Health & Safety Plan. The Work Plan addresses the work to be accomplished to eliminate the imminent danger to public safety, welfare or the environment. Additionally, the Health and Safety Plan outlines the requirements to conduct site activities in accordance with 29 CFR 1910.120.

It is our understanding that the submission of this SOP constitutes compliance with the directives of the Order.

If you have any questions or concerns, or if we may be of any assistance to you on this matter, please feel free to contact the undersigned.

Very truly yours,

OXFORD ENVIRONMENTAL, INC.

J.A. Timothy Francisco
Environmental Engineer
Project Manager

Gary T. Boyer, P.E., DEE
Sr. Environmental Engineer
Project Engineer

attachment



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1.0 SITE WORK PLAN

STATEMENT OF WORK

This part of the site operation plan describes in detail the actions that will be taken and the materials of construction. The actions are to remove the immediate danger to life and health identified by EPA.. The dangers to people are from skin contact, ingestion, inhalation of PCBs and related compounds. The dangers to wildlife are from soil erosion and sediment loss. Actions to remove the dangers are paving, fencing, signs, grading and drainage improvements.

PAVING

The concept sketch of improvements shows a paving section. In accordance with New Jersey Department of Transportation specifications, paving will consist of a two-inch-thick surface course. This will be supported by a stabilized base course. In areas intended for truck traffic this layer will be six inches thick. In areas intended for no truck traffic, this layer will be four inches thick. Undemeath the stabilized base course will be dense graded aggregate. This base course will vary in thickness from four inches for areas intended for automobile traffic to six inches for areas intended for truck traffic. Thickness of existing gravel in driveways and traffic areas must be obtained to determine how much additional dense graded aggregate must be added to obtain the required thickness and grade. Appendix B contains specifications for aggregate materials, rough grading, aggregate base course, asphaltic concrete paving, manholes and covers, chain link fences and gates, site storm sewerage systems and permanent vegetative cover for soil stabilization.

The concept sketch of improvements also shows areas that may be paved. This includes driveways, alleys, parking lots, sidewalks and paths. Paving must be crowned and graded to drain properly or puddles, flooding, icing and pavement failure will occur.

Not all areas need to be covered with paving. Some areas may be covered with permanent vegetative cover per soil erosion control standards. Only areas needed for traffic or parking need to be paved.

Paving will increase the impervious coverage of the site. Because of the potential for increased flooding, local review of paving and drainage plans is required before work can begin. In order to make plans that can be approved by local authorities, a site plan including topography must be prepared by a licensed surveyor. The site plan must include all existing features to meet New Jersey's municipal land use law. This includes metes and bounds, drainage, waterways, specific utility locations, easements, buildings, structures, vegetation, and general flood plain determination. Although photos of the site are included in Appendix A, existing data is not adequate to prepare construction drawings and specifications.

?
local
review
ok applicability
under NCP

Proposed features must also be drawn to obtain local approval. This may include location of drives, parking layout, pedestrian circulation, means of ingress and egress, drainage facilities, flow equalization facilities, landscaping, signs, and fencing.

It is possible that an informal site plan may be approved for this case considering that it is a project to protect public health and the environment, many formal procedures may be waived by the locality. However, a more detailed plan for construction must be prepared. Existing data are not enough. A site survey of existing conditions must be prepared by a licensed surveyor. Then a licensed engineer can prepare proper grading and drainage plans, including storm detention and sediment and erosion control. Proceeding without proper plans could very well make a bad situation worse. Therefore, a licensed surveyor will be engaged to prepare a plan of existing conditions. A licensed engineer will then prepare plans and specifications for proposed improvements based on the survey.

Survey
Site plan

The vicinity map shows a USGS topographic map of the site. Although the map is at a large scale and does not show much detail, it is clear that the site is rather flat. Thus, grading and drainage must be carefully controlled to prevent flood damage.

The site plan to be prepared after the survey will also show existing manholes and storm drains. It is important to raise manholes and not pave them over. Otherwise they cannot be maintained and will soon fail when filled with mud. The size and grade of existing storm sewers and basins must also be obtained to see if they are adequate to avoid flooding and to trap sediment.

Storm water sediment is normally trapped in catch basins and detention basins. In this case, because the site is flat and little space may be available, detention basins may not be possible. Various storm water treatment devices that are compact such as special catch basins will have to be investigated to see if they will apply to this site. If needed, they will be incorporated into the design. *storm water*

FENCING

detention
Fences will be installed to restrict pedestrian circulation from areas of possible contact with soil containing excessive levels of PCBs, heavy metals and similar compounds. The concept sketch of improvements shows a fence around the perimeter. The survey will determine how much fence exists. Local officials will be consulted to learn what the setback from the property line must be. Appendix B contains specifications for chain link fencing and gates.

The concept sketch of improvements shows where fencing may be required. The overall site will be restricted to access by authorized personnel and pedestrians will be restricted to walkways and drives. Fencing to keep pedestrians off areas inside the property lines is not shown because of inadequate data to prepare a sketch. This item will have to be addressed after the survey is done. ✓

DRAINAGE CONTROLS

Drainage controls are required to avoid flooding and to control soil erosion and sediment.

Paving will increase the impervious coverage of the site. Because of the potential for increased flooding, erosion and siltation, local review of paving and drainage plans is required before work can begin.

It is possible that an informal site plan may be approved for this case. Considering that it is a project to protect public health and the environment, many formal procedures may be waived by the locality.

A more detailed plan must be prepared than can be made from existing data. A site survey of existing conditions must be prepared by a licensed surveyor. Then a licensed engineer can prepare proper grading and drainage plans, including storm detention and sediment and erosion control. Proceeding without proper plans could very well make a bad situation worse. Therefore, a licensed surveyor will be engaged to prepare a base map for planning proper fencing, grading, paving and drainage controls. A licensed engineer will then prepare plans and specifications based on the survey.

The vicinity map shows a USGS topographic map of the site. Although the map is at a large scale and does not show much detail, it is clear that the site is rather flat. Flooding along Bound Brook and its tributaries has been a problem for many years. Thus, grading and drainage must be carefully controlled to prevent flood damage.

Drainage controls must also show existing manholes and storm drains to be raised, regraded, repaired or replaced. It is important to raise manholes and not pave them over. Otherwise they cannot be maintained and will soon fail when filled with mud. The size and grade of existing storm sewers

and basins must also be carefully planned to see if they are adequate to avoid flooding and to trap sediment.

Storm water sediment is normally trapped in catch basins and detention basins. In this case, because the site is flat and little space may be available, detention basins may not be possible. Various storm water treatment devices that are compact such as special catch basins or swirl separators or filters, will have to be investigated to see if they will apply to this site. Space and grade is at a premium, so compact, shallow devices must be used.

Devices must be maintained faithfully or the system will fail. A first step may be regular street sweeping after pavement is installed. This has been documented to reduce storm water pollution by roughly seventy percent.

WARNING SIGNS

The sketch of improvements shows a typical warning sign. These will be placed according to the health and safety plan. Signs will be placed approximately every 100 feet along fences, shown on the concept sketch of improvements.

END OF SECTION

HEALTH & SAFETY PLAN

SCOPE OF HASP

The following Health and Safety Plan (HASP) is intended to serve as the minimum requirements for implementation of the Site Operations Plan (SOP) detailed in the previous section. The information contained herein represents the health and safety procedures to be employed during the course of work activities at a regulated hazardous waste site, or where environmental contaminants may be encountered during the course of field operations. The HASP has been prepared to address health and safety issues specific to the Cornell-Dubilier Electronics site, as well as satisfying the requirements of OSHA's Standards for Hazardous Waste Operations and Emergency Response (29 CFR 1910.120) and EPA's Standard Operating Safety Guide, OSWER Directive 9285.103, June 1992.

LIMITATIONS

This HASP details the minimum health and safety requirements to be employed while performing site stabilization activities at the Cornell-Dubilier Electronic Site, hereinafter referred to as the "Site." This plan is not a comprehensive training manual nor does it detail all procedures that may be utilized on site, however, it is intended to be a guidance manual for specific site operations to be deemed appropriate. Detailed information and guidance on materials covered in this plan is adopted from general accepted industry standards and professional practices. All regulations of the Occupational Safety and Health Act (OSHA) are to be adhered to by Oxford Environmental, Inc., its employees, representatives and subcontractors, and shall be responsible for initiating, maintaining, and supervising all safety protocols and programs in connection with the work.

This HASP has been prepared based on information reviewed from previous studies prepared by third parties, consultants, and regulatory agencies, including but not limited to Malcolm-Pimie, U.S. Environmental Protection Agency, ENSA Environmental, Inc., and ICF Kaiser Engineers. Oxford Environmental, Inc. makes no warranties, either expressed or implied, as to the accuracy or completeness of information contained in the documents reviewed to aid Oxford in the preparation of this HASP. As such, the procedures and requirements set forth herein are intended to be used as the minimum guidelines for the implementation of the Work Plan. This HASP is a living document that will be subject to review and/or revision by the designated Site Health and Safety Officer (HSO), as often as required, or as any site specific health and safety issues arise. The implementation of this HASP, shall not relieve other parties from compliance with applicable federal, state, or local regulations or statutes.

STATEMENT OF WORK

The work to be performed for the implementation of this HASP consists of site stabilization measures to eliminate existing potentially *imminently dangerous* conditions at the Site. The potential conditions are a result of the identification of site contaminants in the surface soils at the site from site investigation activities conducted by the EPA and third parties over the last ten years. These site contaminants of concern primarily consist of polychlorinated biphenyls (PCBs), heavy metals (lead, cadmium, chromium), and some polynuclear aromatic hydrocarbons (PAHs).

In accordance with subparagraph VII C.1 of the Administrative Order (EPA Order Index No. II-CERCLA-97-0109), the work requires the following:

- a) Pave of all unpaved areas used as driveways, parking areas and walkways.
- b) Institute site controls and restrict access to areas of known PCB contamination. Site controls shall at a minimum include the installation of six-foot chain link fence and the posting of warning signs. Access to areas of known PCB contamination not addressed above, shall be limited to personnel involved in the implementation of the tasks set forth in the Order.
- c) Implement engineering controls to limit the migration of contaminants through surface water run-off to the unnamed tributary of the Bound Brook which borders the Site.
- d) Maintain systems installed above.

In attempting to provide a comprehensive HASP within the schedule of constraints set forth in the Order, it is the intent of this plan to comply fully with all applicable health and safety standards. Documents and sources identified in the HASP are attached or incorporated by reference, and shall be made available upon request.

SUBMITTALS

The following submittals shall be provided to the authority having jurisdiction on the site. Records including, but not limited to evidence of training (29 CFR 1910.120), medical clearance forms, and respirator fit test shall be submitted prior to site activities.

SITE DESCRIPTION

Site Name:	Cornell-Dubilier Electronics Site
Location:	Hamilton Industrial Park 333 Hamilton Boulevard South Plainfield, New Jersey
Site Occupants:	Approximately fifteen business occupying on-site structures
Site Access:	Unpaved and gravel driveways from Hamilton Boulevard
Identified Hazards:	PCBs (specifically Aroclor-1254), lead, arsenic, cadmium, chromium, copper, mercury, silver and zinc in surface and subsurface soils throughout the site.
Affected Area:	Surface soil, subsurface soil throughout site, especially around fenced-in area and foot/bike path at the rear of site; stream sediment in the unnamed tributary of Bound Brook; impact to groundwater has not been determined.
Surrounding Population:	Approximately 540 persons reside within 0.5 miles of the Site, with the nearest residential homes being located on Spicer Avenue and on the opposite side of Hamilton Boulevard.

AREAS OF CONCERN & CONTAMINANT CONCENTRATIONS

According to the site investigation reports reviewed, the entire site is to be considered an area of concern. The primary area of concern is located towards the rear of the site where electrical components were identified in the surface and subsurface soils.

Analytical results for samples collected by the U.S. EPA indicate that PCBs, lead, and various heavy metals were found to exceed the acceptable federal and state standards. No determination or effort has been made to determine impact to groundwater. The table below presents the contaminants and their concentrations found at on site:

<i>Area of Concern</i>	<i>Contaminant (Concentration)</i>
Unpaved stone and gravel driveways, parking areas, and walkways,	PCBs (340 mg/kg, roadway) Lead (340 mg/kg, roadway) Arsenic (09 mg/kg, roadway surface) Cadmium (373 mg/kg, beneath unpaved roadway)
Surface soil, various locations	PCBs (1,100 mg/kg to 51,000 mg/kg, fenced area) Lead (2,200 mg/kg, soil) Arsenic (25.7 mg/kg, soil) Cadmium (36.1 mg/kg, soil) Chromium (78.6 mg/kg, soil) Copper (3,020 mg/kg, soil) Mercury (2.9 mg/kg, soil) Silver (26.7 mg/kg, soil) Zinc (1,380 mg/kg, soil)
Subsurface soil, various locations	PCBs (22,000 mg/kg, subsurface soil) Lead (7,460 mg/kg)
Stream	Trichloroethene (120 ug/kg, sediment; 2 ug/l, surface water)
Foot/bike path	PCBs (3,000 mg/kg, soil) Lead (66,000 mg/kg, soil) Cadmium (271 mg/kg, soil)

According to the Work Plan, contaminated soil has been identified at unpaved, gravel driveways, parking areas and walkways. These areas will be paved over to eliminate potential imminent danger to the site occupants, the surrounding population, and the general public. The area for paving has been estimated based on site plans, environmental reports, observation of existing conditions. Actual area shall be based on land survey and engineering design activities.

KEY PERSONNEL

The following organizational chart identifies the designated personnel and chain-of-command to carry out the stated job functions on site.

HAZARD ASSESSMENT

The following substance(s) are known or suspected to be present on site. The estimated concentration of contaminants to be encountered, the media in which those hazards exist, and the potential routes for exposure are also provided below:

Known or Suspected Contaminants Present On Site	Route of Health Hazard; Symptoms; Exposure limits
<i>Polychlorinated Biphenyls (PCBs, Chrolodiphenyl, Aroclor® 1254, Aroclor® 1248) CAS No. 11097-69-1</i>	<i>Hazard: Inhalation, Absorption (Skin), Ingestion, Contact (Skin and/or eye contact)</i> <i>Symptoms: Eye irritation, chloracne; liver damage; carcinogen</i> <i>NIOSH: 0.001 mg/m3 OSHA: 0.5 mg/m3</i>
<i>Lead (as Pb)</i>	<i>Hazard: Inhalation, Ingestion, Contact (Skin and/or eye contact)</i> <i>Symptoms: Weakness, fatigue insomnia, facial pallor, anorexia, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis wrist/ankles, encephalopathy, neuropathy, eye irritation, hypotension</i> <i>NIOSH: 0.100 mg/m3 OSHA: 0.05 mg/m3 IDLH: 1700 mg/m3</i>
<i>Arsenic (inorganic as As) CAS No. 7440-38-2</i>	<i>Hazard: Inhalation, Ingestion, Absorption (Skin), Contact (Skin and/or eye contact), carcinogen</i> <i>Symptoms: ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpig of skin</i> <i>NIOSH: 0.002 mg/m3 (15-min) OSHA: 0.010 mg/m3 IDLH: 100 mg/m3</i>

Cadmium (dust) CAS No. 7440-43-9	Hazard: Inhalation, Ingestion, carcinogen Symptoms: pulmonary edema, dyspnea, cough, chest tightness, substernal pain, headaches, chills, muscle aches, nausea, vomiting, diarrhea, anosmia, emphysema, proteinuria, mild anemia NIOSH: lowest feasible conc. OSHA: 0.2 mg/m ³ , C 0.6 mg/m ³ IDLH: 50 mg/m ³
Chromium CAS No. 7440-47-3	Hazard: Inhalation, Ingestion Symptoms: histiolillogic fibrosis of lungs NIOSH: 0.5 mg/m ³ OSHA: 1.0 mg/m ³ IDLH: not established
Copper CAS No. 7440-50-8	Hazard: Inhalation, Ingestion, Contact (Skin and/or eyes) Symptoms: irritaation of nasal mucus membranes/pharynx, nasal perforation, eye irritation, metallic taste, dermatitis NIOSH/OSHA: 1.0 mg/m ³ IDLH: not established
Mercury (metallic) CAS No. 7439-97-6	Hazard: Inhalation, Absorption (skin), Contact (Skin and/or eyes) Symptoms: cough, chest pain, dyspnea, bronchial pneuitis, tremor, insomnia, irritability, indecision, headaches, fatigue, weakness, stomatitis, salivation, gastrointestinal disturbance, anorexia, low weight, proteinuria, eye and skin irritation NIOSH/OSHA: 0.05 mg/m ³ (skin) IDLH: 28 mg/m ³
Silver (metal dust) CAS No. 7440-22-4	Hazard: Inhalation, Ingestion, Contact (Skin and/or eyes) Symptoms: blue-gray eyes, nasal septum, throat, skin; skin irritation, ulceration; gastrointestinal disturbance NIOSH/OSHA: 0.01 mg/m ³ IDLH: not established

<p>Zinc CAS No. 7440-66-6</p>	<p>Hazard: Inhalation</p> <p>Symptoms: sweet, metallic taste; dry throat, cough, chills, fever; tight chest, dyspnea, rales, reduced pulmonary function; headaches; blurred vision; muscle cramps, low back pain; nausea,; vomiting; fatigue, malaise</p> <p>NIOSH/OSHA: 5 mg/m3; STEL 10 mg/m3 IDLH: not established</p>
<p>1,2-Dichloroethene CAS No. 156-60-5</p>	<p>Hazard: Inhalation, Ingestion, Contact (skin)</p> <p>Symptoms: irritation of eye, respiratory system; CNS depression</p> <p>NIOSH/OSHA: 200 ppm (790 mg/m3) IDLH: 4000 ppm</p>
<p>Trichloroethene CAS No. 79-01-6</p>	<p>Hazard: Inhalation, Ingestion, Contact (skin), carcinogen</p> <p>Symptoms: headaches, vertigo; visual disturbance, tremors, somnia, nausea, vomiting,; eye irritation; dermatitis; cardiac arrhythmias, paresthesia</p> <p>NIOSH: 25 ppm OSHA: 50 ppm (270 mg/m3), STEL 200 ppm (1080 mg/m3) IDLH: 1000 ppm</p>

Source: NIOSH Pocket Guide to Chemical Hazards, 1990.

Additional hazards may be encountered on site, but have not been identified. When they are identified, a hazard assessment shall be performed for each substance. Hazardous substance information form(s) for the identified substance(s) are attached.

EMPLOYEE TRAINING

All personnel involved with on-site operations shall meet the following minimum requirements for training: OSHA 40-hour Hazardous Waste Operations in accordance with 29 CFR 1010.120(e). The following table summarizes the training of project personnel.

Name	Title/Function	Training
Timothy Francisco	Environmental Engineer Project Manager/Site Manager Alt. Site Health & Safety Officer	OSHA 40-hour HAZWOPER Worker OSHA 8-hour HAZWOPER Supervisor
Gary Boyer	Sr. Environmental Engineer Project Engineer	OSHA 40-hour HAZWOPER Worker OSHA 8-hour HAZWOPER Supervisor
Harold Blaine	Project Scientist Site Health & Safety Officer	OSHA 40-hour HAZWOPER Worker OSHA 8-hour HAZWOPER Supervisor CPR and First Aid

REQUIREMENTS FOR TRAINING

1. General site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.
2. Workers on site only occasionally for a specific limited task (such as, but not limited to, ground water monitoring, land surveying, or geo-physical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.
3. Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.
4. Workers with 24 hours of training, and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and two days of training necessary to total the training.
5. Management and supervisor training. On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations shall receive 40 hours initial training, and three days of supervised field experience and at least eight additional hours of specialized training at the time of job assignment on such topics as, but not limited to, the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques.
6. Qualifications for trainers. Trainers shall be qualified to instruct employees about the subject matter that is being presented in training. Such trainers shall have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they shall have the academic credentials and instructional experience necessary for teaching the subjects. Instructors shall demonstrate competent instructional skills and knowledge of the applicable subject matter.
7. Training certification. Employees and supervisors that have received and successfully completed the training and field experience shall be certified by their instructor or the head instructor and trained supervisor as having successfully completed the necessary training. A written certificate shall be given to each person so certified. Any person who has not been so certified or who does not meet the requirements shall be prohibited from engaging in hazardous waste operations.
8. Emergency response. Employees who are engaged in responding to hazardous emergency situations at hazardous waste clean-up sites that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.
9. Refresher training. Employees, managers and supervisors shall receive eight hours of refresher training annually, any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

10. Equivalent training. Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training shall not be required to provide the initial training requirements of those paragraphs to such employees and shall provide a copy of the certification or documentation to the employee upon request. However, certified employees or employees with equivalent training new to a site shall receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site work experience.

SUBCONTRACTORS & VISITORS

All subcontractors and their employees shall meet the minimum training requirements as set forth in 29 CFR 1010.120(e), OSHA 40-hour Hazardous Waste Operations. Authorized visitors shall also meet these training requirements. Evidence of training shall be submitted prior to commencement of site activities.

PERSONAL PROTECTION

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

Location	Job Functions	Recommended Level of Protection
Exclusion Zone	Excavation, grading, stockpiling, paving, drilling, and sampling of contaminated soils.	Level A <input type="checkbox"/> Level B <input type="checkbox"/> Level C <input checked="" type="checkbox"/> Level D <input type="checkbox"/> Conduct continuous initial monitoring with above recommended level of protection. When real time air monitoring indicates any detectable airborne organic vapors or IDLH conditions, upgrade PPE as directed by HSO.
Contamination Reduction Zone	Decontamination procedures;	Level A <input type="checkbox"/> Level B <input type="checkbox"/> Level C <input checked="" type="checkbox"/> Level D <input checked="" type="checkbox"/> Conduct monitoring as required. If contaminant concentrations exceed the OSHA time-weighted average (TWA) concentrations, upgrade PPE to next level. Use real-time monitoring.
Support Zone	Mobilization, demobilization	Level A <input type="checkbox"/> Level B <input type="checkbox"/> Level C <input type="checkbox"/> Level D <input checked="" type="checkbox"/> Upgrade PPE or evacuate area if monitoring instruments indicate detectable levels.

Specific protective equipment for the recommended level of protection is as follows:

Level D	Level C
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<ul style="list-style-type: none">• Disposable booties/work boots• Hard hat• Safety glasses/goggles• Rubber gloves, safety goggles	<ul style="list-style-type: none">• Level D protection, plus• Nitrile gloves• Full-face air purifying respirator• Tyvek or splash apron• Disposable booties• Splash aprons is recommended when handling contaminated water or equipment.
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Important: No changes to the specified levels of protection shall be made without the approval of the site safety officer and the project team leader.

MEDICAL SURVEILLANCE

Oxford Environmental, inc. maintains a medical surveillance program in accordance with 29 CFR 1910.120. The medical surveillance program has been instituted for:

1. All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;
2. All employees who wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134;
3. All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and
4. Members of HAZMAT teams.

Medical examinations and consultations shall be made available to each employee covered under the medical surveillance program on the following schedules:

1. Prior to assignment;
2. At least once every twelve months for each employee covered unless the attending physician believes a longer interval (not greater than biennially) is appropriate;
3. At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last six months;
4. As soon as possible upon notification by an employee that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the permissible exposure limits or published exposure levels in an emergency situation;
5. At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary.

For employees who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an

emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits or the published exposure levels without the necessary personal protective equipment being used:

1. As soon as possible following the emergency incident or development of signs or symptoms;
2. At additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary.
3. Content of medical examinations and consultations.

MEDICAL EXAMINATIONS

Medical examinations include a medical and work history (or updated history if one is in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under conditions (i.e., temperature extremes) that may be expected at the work site.

The content of medical examinations or consultations made available to employees shall be determined by the attending physician. The guidelines in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities shall be consulted.

All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

Information provided to the physician. The employer shall provide one copy of the standard and its appendices to the attending physician, and in addition the following for each employee:

- (i) A description of the employee's duties as they relate to the employee's exposures.
- (ii) The employee's exposure levels or anticipated exposure levels.
- (iii) A description of any personal protective equipment used or to be used.
- (iv) Information from previous medical examinations of the employee which is not readily available to the examining physician.
- (v) Information required by 29 CFR 1910.134.

PHYSICIAN'S WRITTEN OPINION

Oxford shall obtain and furnish the employee with a copy of a written opinion from the attending physician containing the following:

1. The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.
2. The physician's recommended limitations upon the employee's assigned work.

3. The results of the medical examination and tests if requested by the employee.
4. A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

The written opinion shall not reveal specific findings or diagnoses unrelated to occupational exposures.

RECORDKEEPING

An accurate record of the medical surveillance shall be retained. This record shall be retained for the period specified and meet the criteria of 29 CFR 1910.20. The records shall include at least the following information:

1. The name and social security number of the employee;
2. Physician's written opinions, recommended limitations, and results of examinations and tests;
3. Any employee medical complaints related to exposure to hazardous substances;
4. A copy of the information provided to the examining physician by the employer, with the exception of the standard and its appendices.

SITE MONITORING

Monitoring shall be performed where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of employee protection needed on site.

Initial entry. Upon initial entry, representative air monitoring shall be conducted to identify and IDLH condition, exposure over permissible exposure limits or published exposure levels, exposure over a radioactive material's dose limits or other dangerous condition such as the presence of flammable atmospheres or oxygen-deficient environments.

Periodic monitoring. Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

1. When work begins on a different portion of the site.
2. When contaminants other than those previously identified are being handled.

3. When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling).
4. When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon).
5. Monitoring of high-risk employees. After the actual clean-up phase of any hazardous waste operation commences; for example, when soil, surface water or containers are moved or disturbed; the employer shall monitor those employees likely to have the highest exposures to hazardous substances and health hazards likely to be present above permissible exposure limits or published exposure levels by using personal sampling frequently enough to characterize employee exposures. If the employees likely to have the highest exposure are over permissible exposure limits or published exposure limits, then monitoring shall continue to determine all employees likely to be above those limits. The employer may utilize a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are based on the criteria stated above.

MONITORING OBJECTIVES

Health and safety (H&S) monitoring will be conducted on the site during all field activities to accomplish the following objectives:

1. To ensure proper selection of personal protective equipment;
2. To delineate areas where personal protection is needed;
3. To evaluate the potential health effects of exposure to contaminants; and
4. To protect and safeguard the health and safety of the workers, the general public and the environment.

MONITORING INSTRUMENTATION

Direct reading instruments will be used to give instantaneous information concerning levels of contaminants. These shall include but are not limited to:

1. A combustible gas/oxygen detector for detection of flammable or explosive atmospheres and oxygen deficiency.
2. Organic vapor meter (OVM) or photoionization detector (PID)
3. Detector tubes for monitoring specific air contaminants.

All field screening and monitoring devices shall be operated by a qualified individual familiar with the instrument's operating principles and limitations.

AIR SURVEILLANCE

The above monitoring instruments shall be used on site at the specified intervals and locations:

<i>Monitoring Instrument</i>	<i>Continuous</i>	<i>Hourly</i>	<i>Daily</i>	<i>Other</i>
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Combustible Gas Indicator		work zone		as required
Oxygen Monitor				as required
Detector Tubes (Draeger, Sensidyne)				as required
Organic Vapor Meter / Photo-ionization Detector	work zone	perimeter		
Aerosol Dust Monitor	work zone	perimeter		
Personal Breathing Zone Air Sampling			work zone	

ACTION LEVELS

The exceedance of the following Action Levels (AL) shall dictate the re-evaluation of potential hazards, engineering controls, personal protective equipment, or work procedures by the Health and Safety Officer, and the appropriate response to be taken.

<i>Hazard</i>	<i>Action Level</i>	<i>Response</i>
Flammability, Explosivity	10% of LEL	stop work, evacuate work area, determine source if possible; ventilate area, re-occupy as directed by HSO
Oxygen Deficiency	<19.5%	stop work, evacuate area; wait until oxygen content is greater than 19.5%
Target Chemical	any detectable concentration	stop work, determine source if possible; if detectable re-assess personal protective equipment
Organic vapors (instrument RF calibrated to Methane)	0.1 ppm	stop work, determine source if possible; if detectable re-assess personal protective equipment
Nuisance Dust (Heavy metals)	5 mg/m ³	stop work, determine source if possible; if detectable re-assess personal protective equipment

SITE CONTROL

An on-site command post shall be established on-site. The HSO shall coordinate site access and security on site. A safe perimeter will be established in all directions of the area of concern. No unauthorized persons shall be allowed within this area. The buddy system shall be employed during all field operations.

The prevailing wind conditions are variable and shall be assessed by the HSO on a daily basis prior to the performance of work activities. The Support Zone (clean area) and Contamination Reduction Zone (decontamination area) shall be located upwind from the Exclusion Zone (the contaminated area or Hot Zone).

Control boundaries shall be established and designated as follows:

Control Zone	Control Boundary	Wind Direction
Exclusion (Hot) Zone	Safety fencing / barricade (orange)	↔
Contamination Reduction (Decontamination) Zone	Caution tape (yellow)	
Support Zone (Field Office)	Traffic cones (safety orange)	

All personnel arriving or departing the site shall log in and out with the record-keeper or HSO. All activities on site must be cleared through the Site Manager or EPA's OSC. All other visitors site shall check in with the Health and Safety Officer or Project Leader. Upon satisfactory presentation of credentials and training certifications, he/she shall log in and out with the record-keeper. All activities of the visitor on site must be cleared through the project team leader prior to commencing them. Any person found to be in violation of the HASP, poses a potential liability to the safety and welfare of personnel, the general public or the environmental, or as determined by the HSO/Site Manager shall be escorted off-site and shall not be allowed back on site under any circumstances.

WARNING SIGNS

The following warning sign shall be posted at all entrances to the site and at intervals along the proposed property boundary fence line.



UNKNOWN HAZARDS

In all situations where the types of potentially hazardous waste material is unknown, maximum protection levels are maintained until the hazards can be adequately assessed. A decision to downgrade or upgrade the level of personnel protection by the HSO will be based on:

1. Readings from real time survey/monitoring instrumentation (i.e. explosimeter, organic vapor analyzer, toxic gas monitor)
2. Visual observations such as stressed vegetation, wind, dust, temperatures, discoloration of soils, evidence of leaking drums, product vessels.
3. Sensory observations such as odors and fumes
4. Specific information of the known chemical contaminants (i.e. low flash point, reactivity)

COMMUNICATIONS PROCEDURES

BUDDY SYSTEM

The buddy system shall be utilized at all times.

HAND SIGNALS



thumbs up with motion..... lift up



thumbs down no good, try again



point left move this way, follow me



point right move this way, follow me



point up with circling motion lift up



one hand open stop



both hands open with back up



point down wait here or pour here



fore finger and index finger up pause, wait a minute



thumb and fore finger touching okay

RADIO COMMUNICATIONS

Channel (TBD) has been designated as the radio frequency for personnel in the Exclusion Zone. All other on-site communications will use channel (TBD).

Personnel in the Exclusion Zone should remain in constant radio communication or within sight of the Project Leader. Any failure of radio communication requires an evaluation of whether personnel should leave the Exclusion Zone.

EMERGENCY COMMUNICATIONS

In the event of an emergency and failure of radio communications, the following air horn signals shall be used:

- - - three intermittent short blasts.....leave the exclusion zone
- -- two short blasts..... emergency, need help
- _____ One long blastall clear signal

DECONTAMINATION PROCEDURES

Decontamination procedures ensure that personnel or equipment in the contamination zone do not spread or carry hazardous materials into the decontamination zone. The procedures will be revised whenever the type of personal protective clothing or equipment changes, the site conditions change, or the site hazards are reassessed based on new information.

A designated area will be established by Schiavone Construction Company for personnel decontamination and equipment decontamination. Personnel and equipment decontamination should be separated by no less than 25 feet or as designated by the HSO. The equipment decontamination area should be downwind of the personnel decontamination area.

The first step in decontamination is to establish standard operating procedures that minimize initial contact with waste and thus the potential for contamination. Some examples are:

1. Using remote sample, handling, and container opening techniques whenever appropriate.
2. wearing disposable protective clothing and using disposable equipment where appropriate.
3. Covering equipment and tools with a strippable coating which can be removed during decontamination.
4. All protective clothing is checked prior to use, to ensure that it contains no cuts or punctures that could expose workers to waste.

In many cases, gross contamination can be removed by physical means involving dislodging/displacement, rinsing, wiping-off, or evaporation. Physical removal of gross contamination will be followed by wash/rinse process using cleaning solution.

PERSONNEL DECONTAMINATION

All workers entering the exclusion, contamination reduction zones shall employ the correct procedures for decontamination and for changing from contaminated clothing to clean clothing as described below:

Station	Type	Decontamination Procedure
1	Plastic sheet placed on ground downwind of personnel decontamination stations.	Field Equipment - Drop field equipment (sampling equipment, instruments and samples) on sheet.
2	A wash tub equipped with large brush filled with a decontamination solution (soap and water).	Outer Garments - Use scrub brush to remove gross contamination.
3	A second wash tub filled with rinse solution ("clean" water).	Outer Garments - Rinse off decontamination solution.
4	A third wash tub equipped with large brush filled with decontamination solution (soap and water).	Outer Garments - Use scrub brush to remove gross contamination.
5	A fourth wash tub filled with rinse solution ("clean" water).	Outer Garments - Final rinse decontamination solution from outer garments with clean water.
6	Two buckets filled with decontamination solution (soap and water)	Boots and Gloves - Use scrub brush and decontamination solution to remove all gross contamination.
7	One bucket filled with rinse solution ("clean" water)	Boots and Gloves - Rinse decontamination from boots and gloves with clean water.
8	A trash can with plastic liner	Disposable Items - Remove disposable items such as gloves, boots, Tyvek suits in trash can.
9	Plastic sheet on ground	Respirators - Drop respiratory equipment on plastic sheet for decontamination.
10	Trash can with plastic liner	Clothing - Place any clothing items used under protective clothing in plastic lined trash can and don clean street clothing.

EQUIPMENT DECONTAMINATION

All equipment brought into the exclusion and contamination reduction zones shall be decontaminated using the following procedures:

Station	Type	Decontamination Procedure
1	Plastic sheet placed on ground downwind of personnel decontamination stations.	Field Equipment - Drop field equipment (sampling equipment, instruments and samples) on sheet.
2	A wash tub equipped with large brush filled with a decontamination solution (soap and water).	Soap wash and rinse, solvent rinse, if necessary.
3	Decontamination pad equipped with water hose, brushes and steam cleaning equipment.	Vehicles - Steam clean heavy equipment, if necessary.

GENERAL PROCEDURES

1. Decon wash water for the activities outlined in this plan will be collected for disposal.
2. Disposable clothing or other equipment that is permanently contaminated will be placed in drums for disposal.
3. Decontamination solutions may vary based on the exact constituents of the contaminants. Also, the extent to which the decontamination is carried out may be modified to address particular contaminants or situations.
4. Personnel assisting with decontamination will be in Level C protection unless air monitoring or other information requires a higher level of protection.
5. In extreme situations when there may be a question as to the degree of contamination known or substances of a highly toxic nature are suspected, protective clothing will be discarded after use of tested decontamination.
6. All decontamination methods are assessed by the HSO at the beginning of a program and reviewed periodically throughout the lifetime of the program for its effectiveness.

EMERGENCY RESPONSE PLAN

EMERGENCY NOTIFICATION LIST

In the event of an emergency, the designated HSO shall for direct and coordinate notification of the appropriate emergency entity listed in the table below.

Agency/Facility	Phone
Police	911
Fire / HAZMAT	911
EMS/Ambulance	911
Poison Control Center	1-800-764-7661
NJ Department of Environmental Protection Hotline	609-292-7172

The HSO will immediately inform the Project Leader of any emergency situations, health & safety recommendations, and any pertinent issues. If the HSO is not on-site, the above list shall be used to notify of the incident. The HSO shall then be notified at (800) 377-8218 after notifying the appropriate emergency entity.

CONTINGENCY PLAN

Every remedial action project is posed with the threat of a possible spill of hazardous materials. For this reason, the following requirements are requisite during all operations.

In an emergency situation, the HSO or supervision personnel shall implement an emergency contingency plan. The HSO will coordinate/designate an on-site emergency response team composed of qualified on-site personnel created for specific emergency purposes, such as decontamination, rescue, and entry. Off-site rescue teams (i.e. local HAZMAT) shall be used during particularly dangerous emergency operations, and emergencies beyond the capability of the on-site emergency response team.

SPILL CONTROL PLAN

The best "emergency spill plan" is planning to avoid and prevent spills. All field procedures will be performed with spill prevention as a key factor.

In the event of accidental spillage, the following spill response protocol will be implemented by the local HAZMAT team who are trained in emergencies procedures as follows:

1. First Aid will be administered to injured/contaminated persons. Any employee observing a spill will act immediately to remove and/or protect injured/contaminated persons from any life-threatening situation. First Aid and/or decontamination procedures will be implemented as appropriate.
2. Warn unsuspecting persons/ vehicles of the hazard. Personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting

other nearby persons and by obtaining assistance of other personnel who are familiar with spill control and cleanup techniques.

3. Stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. Personnel will not expend more than a brief effort prior to notifying the Engineer.
4. Utilizing available personal radio communications or other rapid communication procedures, the Engineer will be notified of the spill, including information on material spilled, quantity, personnel injuries, and immediate life-threatening hazards.
5. Spill assessment and primary containment. The Engineer will make a rapid assessment of the spill and direct primary containment measures which may include, but are not limited to:
 - A. Construction of a temporary containment berm utilizing on-site clay absorbent, earth or absorbent pads or booms
 - B. Digging a sump, installing a polyethylene liner and diverting the spilled material to the sump.
6. Spill clean-up. Personnel will cleanup all spills following the spill clean-up plan developed by the Engineer. The Engineer will supervise the spill clean-up. Most equipment, materials, and supplies necessary to clean up a spill will already be immediately available on site. Such items may include, but are not limited to: front-end loader, shovels, rakes, clay absorbent, polyethylene, personal safety equipment (respirators, gloves, boots, protective coveralls, hard hats, eye shields), steel drums, pumps, and miscellaneous hand tools.
7. Spill clean-up inspection. The Engineer will inspect the spill site to determine that the spill has been cleaned up. If necessary, soil water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean up effort.
8. Identify the cause of the spill and remedial action to prevent recurrence. The Engineer will determine the cause of the spill and will determine remedial steps to ensure that recurrence is prevented.

EMERGENCY MEDICAL CARE

First-aid equipment is available on site at the following locations:

First-aid kit	Support Zone
Emergency eye wash	Support Zone
Emergency shower	Support Zone

STANDARD EMERGENCY PROCEDURES

The following standard emergency procedures (should be modified as required for incidents) will be used by on site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate are followed.

Personnel Injury in the Support Zone

1. Upon notification of an injury in the Exclusion Zone, the designated emergency signal shall be sounded.
2. All site personnel shall assemble at the decontamination line.
3. The rescue team will enter the Exclusion Zone (if required) to remove the injured person to the hotline.
4. The Site Safety Officer and Project Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone.
5. The on-site EMT shall initiate the appropriate first-aid; contact should be made for an ambulance and notify the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

Personnel Injury in the Support Zone:

1. Upon notification of an injury in the Support Zone, the Project Team Leader and Site Safety Officer will assess the nature of the injury.
2. If the cause of the injury or loss of the injured person does not affect the performance of site personnel, operations may continue, with the on-site EMT initiating the appropriate first-aid and necessary follow-up as stated above.
3. If the injury increases the risk to others, the designated emergency signal shall be sounded and all site personnel shall move to the decontamination line for further instructions. Activities on site will stop until the added risk is removed or minimized.

Fire/Explosion:

1. Upon notification of a fire or explosion on site, the designated emergency signal shall be sounded and all site personnel be assembled at the decontamination line.
2. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Personnel Protective Equipment Failure:

1. If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

Other Equipment Failure:

1. If any other equipment on site fails to operate properly, the Project Team Leader and Site Safety officer shall be notified and then determine the effect of this failure on continuing operations on site.
2. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

Emergency Egress and Evacuation:

The following emergency escape routes are designated for use in those situations where egress from the Exclusion Zone cannot occur through the decontamination line:

IMPORTANT: In the event of an emergency, the egress route shall be any area immediately and safely accessible by site personnel. Decontamination procedures may be circumvented in an emergency situation.

In all situations, when an on-site emergency results in evacuation of the Exclusion Zone, personnel shall not reenter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed.
3. The Site Safety Plan has been reviewed.
4. Site personnel have been briefed on any changes in the Site Safety Plan.

SITE STANDARD OPERATING PROCEDURES

PERSONAL PROTECTIVE EQUIPMENT

The type of protective equipment recommended for this project has been based on the preliminary evaluation of environmental studies and prior experience with projects of the same type. Any changes or revisions of the recommended personal protective measures shall be by Oxford's Certified Industrial Hygienist (CIH), his designated representative or the Health & Safety Officer.

The following prescribes a personal protection plan when possible exposure to hazardous materials exists. Workers involved with hazardous materials shall be assigned personal protective equipment and proper instruction on its proper use and maintenance. The basic package of personal protective equipment shall contain:

- a full-face respirator
- chemical resistant gloves
- chemical resistant boots
- disposable coveralls

Personnel who handle material known to be hazardous, or of unknown toxicity are required to take sufficient precautions. It is the responsibility of the designated Health and Safety Officer (HSO) to specify the correct level of protective equipment to be used on the job. All field personnel shall receive training in the proper use and methods of wearing protective equipment. The level of protective equipment is determined by the types and levels of material present at the site. These levels are determined through specific knowledge of the hazardous materials and air monitoring as described in this Plan.

CRITERIA FOR SELECTING PERSONAL PROTECTIVE EQUIPMENT

The type of atmospheric concentration of substances need to be identified and may require different level of respiratory protection and skin protection. The following criteria is provided for each level of protection. Selection of the proper personal protection involves meeting one or more criteria.

Level B Protection

1. Atmospheric environments with IDLH concentrations of specific substances that do not represent a skin absorption hazard;
2. Atmospheric environments or airborne contaminant concentrations that do not meet the criteria for use of air-purifying respirators;
3. Atmospheres that contain less than 19.5 percent oxygen;
4. Atmospheric environments with the presence of unknown vapors or gases as indicated by direct-reading organic vapor detection instrument, but vapors and gases that are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through intact skin.

Level C Protection

1. Airborne contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin;
2. Air contaminants have been identified, concentrations measured, and an appropriate respirator canister is available that can remove the contaminant;
3. All criteria for the use of air-purifying respirators are met.

Level D Protection

1. The atmosphere contains no known hazard;
2. Work, functions preclude splashes, immersion, or the potential unexpected inhalation of or contact with hazardous levels of any chemicals.
3. Hazard assessment which initially determines the level of protection to be worn by all personnel will be checked and documented by monitoring procedures.
4. The level of protection depends on the toxicity of chemicals onsite, their concentration in the air, potential for skin contact, flammability characteristics, and general waste site conditions (such as ambient temperature, topography, accessibility, etc.).

Since many of these factors will not be totally recognized in advance of site activities, there always exists some uncertainty as to what level of protection to advise. The job of the HSO is to anticipate exposure concerns and, when in doubt, take a conservative approach. The following tables list selection criteria for levels of protective clothing (Table 1) and respiratory devices (Table 2). They are used only as a guide and not to be considered all inclusive.

Table 1 - Protective Clothing

Personnel equipment to protect the body against contact with known or anticipated hazardous substances or chemicals has been divided into four categories:

1. *Level A* protection will be worn when the highest level of respiratory skin, eye, and mucous membrane protection is needed.
 - a. Pressure demand, self contained breathing apparatus.
 - b. Fully-encapsulating chemical resistant suit.
 - c. Gloves, inner, chemical resistant
 - d. Gloves, outer, chemical resistant.
 - e. Boots, chemical resistant depending on suit boot construction, worn over or under suit boot.
 - f. Hard hat (under suit).
 - g. Coveralls (under suit).
 - h. Two-way radio communications (intrinsically safe).
2. *Level B* protection will be selected when the highest level of respiratory protection is needed, but a lesser level of skin and eye protection. *Level B* protection is the minimum level recommended on the initial site entries until the hazards have been further identified and defined by monitoring, sampling, and other reliable methods of analysis, and personnel equipment corresponding with those findings utilized.
 - a. Pressure-demand self contained breathing apparatus; Chemical resistant clothing (coveralls and long sleeved.
 - b. jacket, coveralls, hooded two piece splash suit, disposable chemical resistant coveralls).
 - c. Coveralls (under splash suit).
 - d. Gloves, outer, chemical resistant.
 - e. Gloves, inner, chemical resistant.
 - f. Boots, outer, chemical resistant.
 - g. Two-way radio communications (intrinsically safe).
 - h. Hard hat.
3. *Level C* protection will be selected when the type of airborne substance is known, concentration measured, criteria for using air-purifying respirators met, and skin and eye exposure is unlikely. Periodic monitoring of the air must be performed.
 - a. Full-face, air-purifying respirator (MSHA/NIOSH approved).
 - b. Chemical resistant clothing (one piece coverall, hooded two piece chemical) splash suit, chemical resistant hood and apron, disposable chemical resistant coveralls.)
 - c. Gloves, outer, chemical resistant. --Gloves, inner, chemical resistant. --Boots, chemical resistant.
 - d. Cloth coveralls (inside chemical protective clothing). --Two-way radio communications (intrinsically safe).
 - e. Hard hat.
 - f. Escape mask (optional).
4. *Level D* is primarily a work uniform. It will not be worn on any site where respiratory or skin hazards exist.
 - a. Gloves, outer, chemical resistant.
 - b. Gloves, inner, chemical resistant.
 - c. Boots, chemical resistant.
 - d. Safety glasses.
 - e. Hard Hat.

Table 2 - Respiratory and Eye Protection

Criteria For Selection

1. Atmospheres that are oxygen deficient (less than 19.5% O_2 or immediately dangerous to life and health (IDLH)--producing an immediate irreversible or effect on health.
2. Atmospheres that may contain high concentrations of unknown levels exceeding the Threshold Limit Values (TLV) for known airborne chemicals, (but are not considered to be Immediately Dangerous to Life and Health (IDLH) conditions).
3. Atmospheres in which the airborne concentrations of all contaminants is known to be less than 50X the respective ACGIH TLVs and provide good warning properties (taste, smell, and irritation)
4. Emergency escape.
5. Potential splash of liquid irritant to chest or facial area (full-face respirator not otherwise specified).
6. General eye protection while on waste site.
7. Emergency rescue.

Type of Protection

1. Pressure-demand, open circuit SCBA
2. Full-face air-purifying cartridge respirator with NIOSH approval for contaminant type
3. Thirty (30) minute pressure-demand cylinder escape pack.
4. Chemical safety goggles plus full-face shield (ref.. Table 1)
5. Safety glasses(contact lenses should not be worn).
6. Positive pressure closed circuit self-contained breathing apparatus (SCBA).

Respiratory Guide

The respirator protection guide has been prepared in accordance with OSHA 29 CFR Part 1910.134 which specifies that respirators shall be selected on the basis of the hazards to which workers may be exposed. The American National Standards Institute (ANSI) Z88.2-1980 standard on respiratory practice can be reference for further guidance.

Final selection of respirators is based on the following criteria:

1. Nature of the situation encountered;
2. Activities of workers in the hazardous area;
3. Type of inhalation hazard including physical properties, physiological effects on the body, warning properties (e.g., small or irritation) air borne contaminant concentration, established TLVs for toxic materials and established IDLH concentration of toxic material;
4. Location of hazardous area in relation to nearest source of acceptable air supply;
5. Length of time respirators are to be used.

Air-purifying respirators can be used in atmospheres that contain adequate oxygen (19.5% or more) contaminated with chemicals that have good warning properties (taste, smell, irritation) and are not immediately dangerous to life and health. When air purifying respirators are utilized the TLV of the contaminant and the protection factor of the mask are used to determine the maximum use limit of cartridge respirator. As a standard practice, cartridges are changed daily.

2. Fit-Testing

The contractor shall provide all personnel who may use an air purifying respirator to go through qualitative fit-test.

The following policies are also adhered to in the fitting and use of the respirators:

1. An employee must have passed the fit test.
2. Facial hair, such as beards, sideburns, or certain mustaches that may interfere with the fit test, are not allowed.
3. Persons requiring corrective lenses are provided with specially mounted lenses inside the full-face mask. Under no circumstances may contact lenses and/or glasses be worn while using full-face respirators.

Respirator training is conducted during annual or initial health and safety training. Instruction is given the proper cleaning of respirators, the respirators' capabilities and limitations.

DEFINITIONS

"Buddy system" means a system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

"Clean-up operation" means an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

"Decontamination" means the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

"Emergency response" or "responding to emergencies" means a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

"Facility" means (A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft, or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any water-borne vessel.

"Hazardous materials response (HAZMAT) team" means an organized group of employees, designated by the employer, who are expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring possible close approach to the substance. The team members perform responses to releases or potential releases of hazardous substances for the purpose of control or stabilization of the incident. A HAZMAT team is not a fire brigade nor is a typical fire brigade a HAZMAT team. A HAZMAT team, however, may be a separate component of a fire brigade or fire department.

"Hazardous substance" means any substance designated or listed under paragraphs (A) through (D) of this definition, exposure to which results or may result in adverse effects on the health or safety of employees;

(A) Any substance defined under section 101(14) of CERCLA;

(B) Any biological agent and other disease-causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;

(C) Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and

(D) Hazardous waste as herein defined.

"Hazardous waste" means

(A) A waste or combination of wastes as defined in 40 CFR 261.3, or

(B) Those substances defined as hazardous wastes in 49 CFR 171.8.

"Hazardous waste operation" means any operation conducted within the scope of this standard.

"Hazardous waste site" or "Site" means any facility or location within the scope of this standard at which hazardous waste operations take place.

"Health hazard" means a chemical, mixture of chemicals or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. It also includes stress due to temperature extremes. Further definition of the terms used above can be found in Appendix A to 29 CFR 1910.1200.

"IDLH" or "Immediately dangerous to life or health" means an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

"Oxygen deficiency" means that concentration of oxygen by volume below which atmosphere supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

"Permissible exposure limit" means the exposure, inhalation or dermal permissible exposure limit specified in 29 CFR Part 1910, Subparts G and Z.

"Published exposure level" means the exposure limits published in "NIOSH Recommendations for Occupational Health Standards" dated 1986 incorporated by reference, or if none is specified, the exposure limits published in the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1987-88" dated 1987 incorporated by reference.

"Post emergency response" means that portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and clean-up of the site has begun. If post emergency response is performed by an employer's own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post emergency response. However, if a group of an employer's own employees, separate from the group providing initial response, performs the clean-up operation, then the separate group of employees would be considered to be performing post-emergency response and subject to paragraph (q)(11) of this section.

"Qualified person" means a person with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

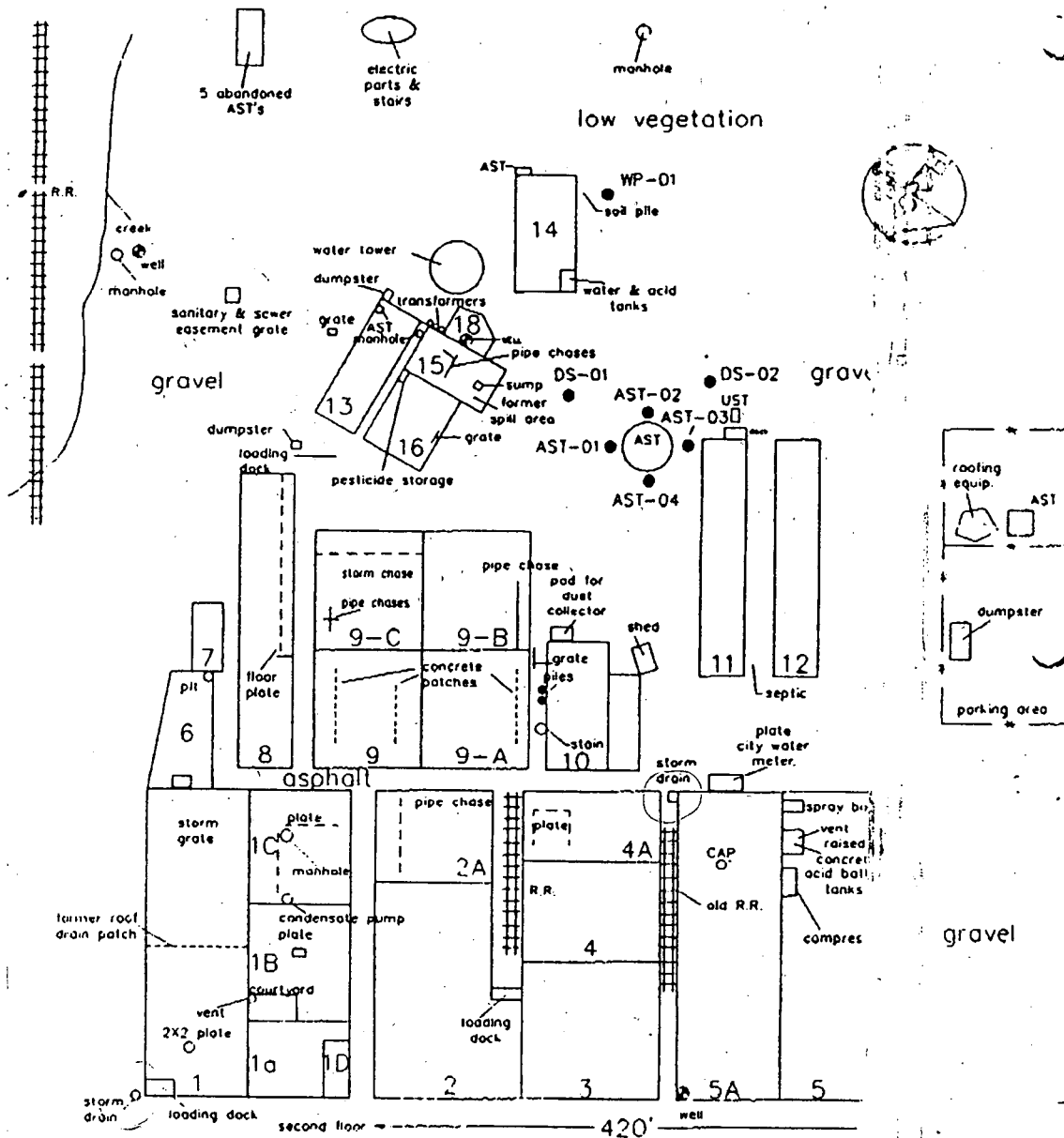
"Site safety and health supervisor (or official)" means the individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

"Small quantity generator" means a generator of hazardous wastes who in any calendar month generates no more than 1,000 kilograms (2,205 pounds) of hazardous waste in that month.

"Uncontrolled hazardous waste site," means an area identified as an uncontrolled hazardous waste site by a governmental body, whether Federal, state, local or other where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands such as those created by former municipal, county or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous substance wastes. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms. Normal operations at TSD sites are not covered by this definition.

I certify that I have read the Health & Safety Plan, its content, and limitations and agree to abide by the procedures discussed herein to ensure the health and safety of the project personnel and the general public. I further certify that I have received the proper training as set forth in 29 CFR 1910.120 and recognize that toxic and hazardous materials may exist on the site.

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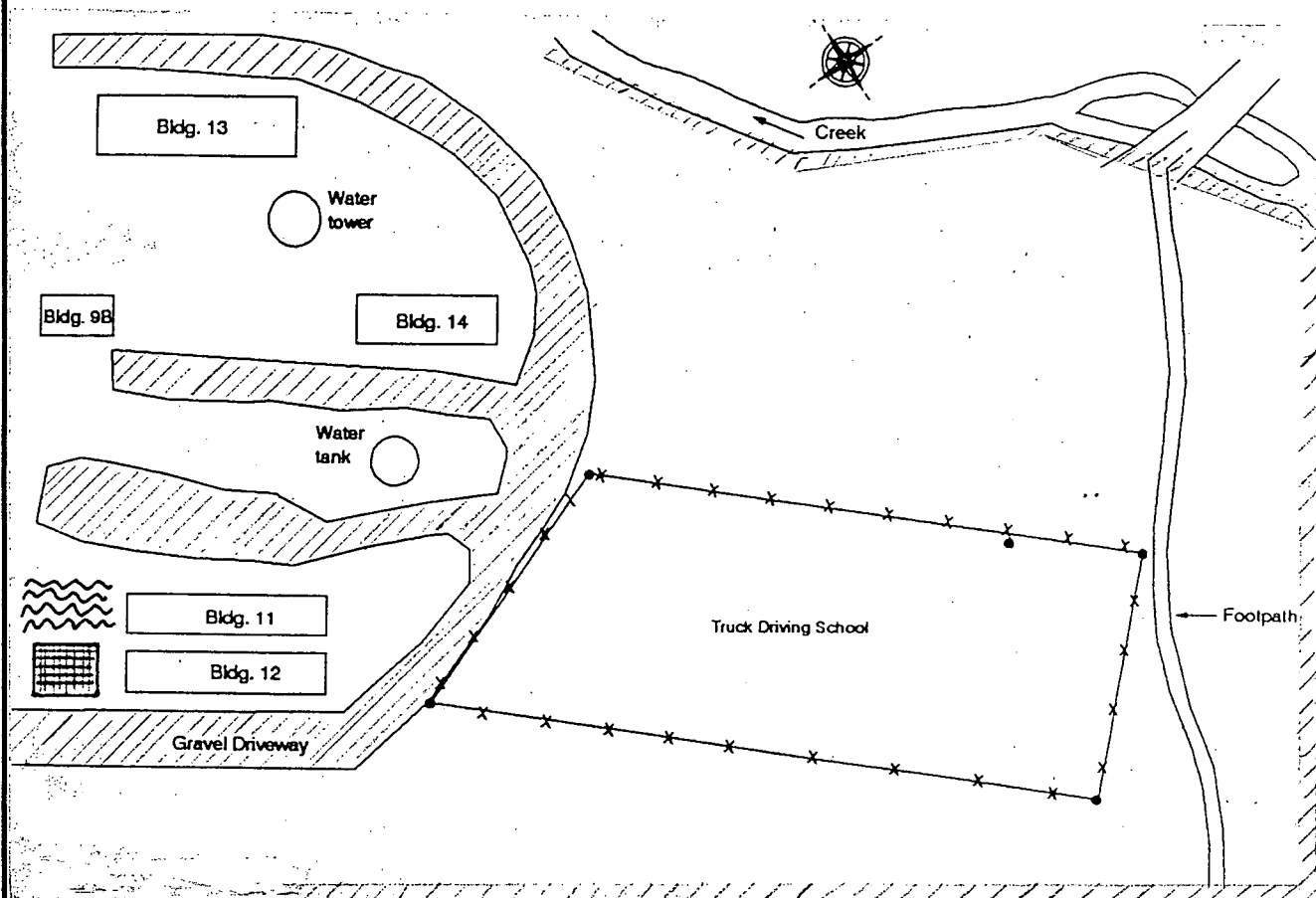
43 Route 46 East, Pine Brook, NJ 07058

Phone (201) 244-0600 · Fax (201) 244-0722

DWG BY TF	PROJ. NO. 9703	DWG NO M-1
CHKD BY	SCALE N.T.S.	
DATE: 5/3/97	REV.	

SITE MAP

CORNELL-DUBILIER ELECTRONICS SITE
HAMILTON INDUSTRIAL PARK
SOUTH PLAINFIELD, NEW JERSEY



**EXCLUSION
ZONE**



**SUPPORT
ZONE**



**CONTAMINATION
REDUCTION
ZONE**



OXFORD ENVIRONMENTAL, INC.

43 Route 46 East, Pine Brook, NJ 07058

Phone (201) 244-0600 • Fax (201) 244-0722

DWG BY
TF

PROJ. NO.
9703

DWG NO
W-1

CHKD BY

SCALE

N.T.S.

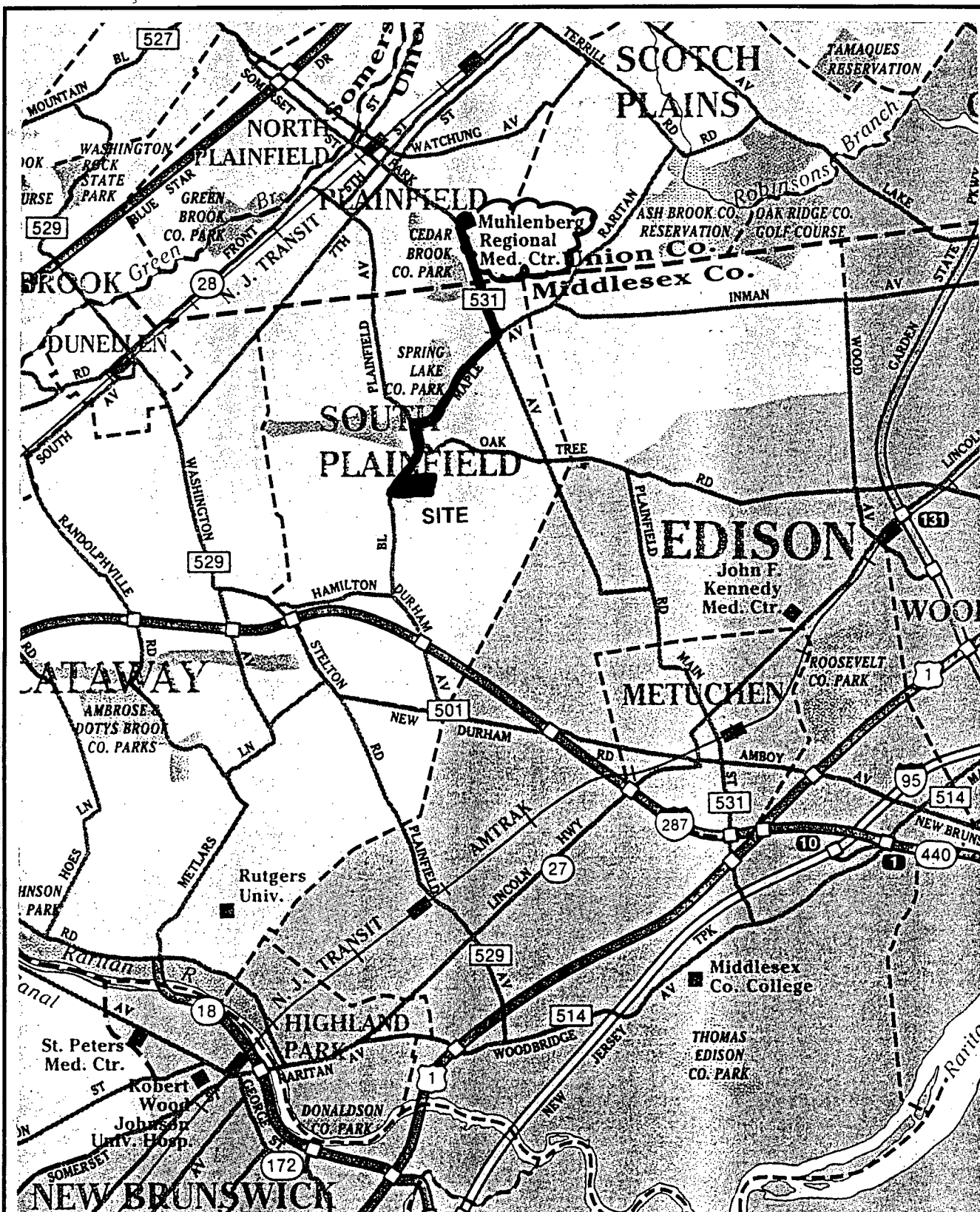
DATE:

5/3/97

REV.

WORK ZONE LAYOUT

CORNELL-DUBILIER ELECTRONICS SITE
HAMILTON INDUSTRIAL PARK
SOUTH PLAINFIELD, NEW JERSEY



OE OXFORD ENVIRONMENTAL, INC.

43 Route 46 East, Pine Brook, NJ 07058

Phone (201) 244-0600 • Fax (201) 244-0722

DWG BY
TF

PROJ. NO.
9703

DWG NO
H-1

CHKD BY

SCALE

N.T.S.

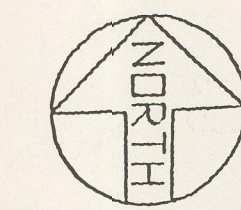
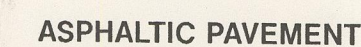
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REV.

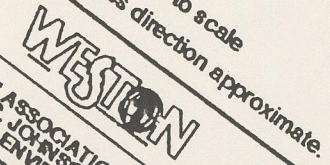
MAP TO NEAREST HOSPITAL

CORNELL-DUBILIER ELECTRONICS SITE
HAMILTON INDUSTRIAL PARK
SOUTH PLAINFIELD, NEW JERSEY

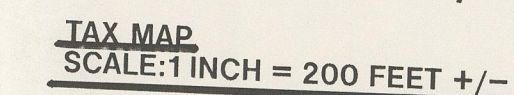
APPENDIX A



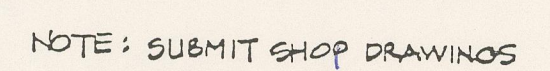
low vegetation



Cornell-Dubiller Electro
South Plainfield, NJ
Figure 1: Site Map



CORNELL DUBILIER ELECTRONICS
SOUTH PLAINFIELD, MIDDLESEX COUNTY, NEW JERSEY
SAMPLE LOCATION MAP
NOT TO SCALE

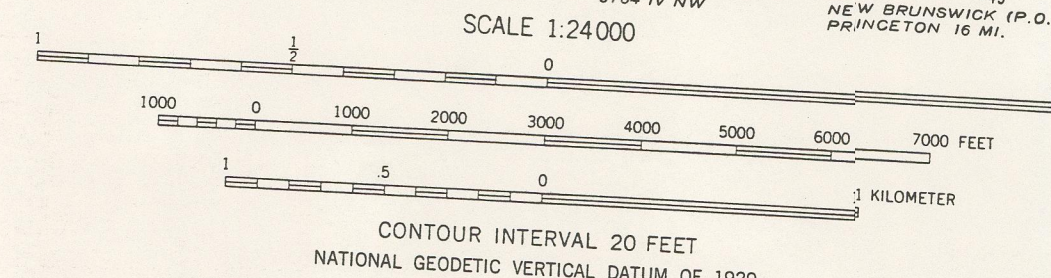
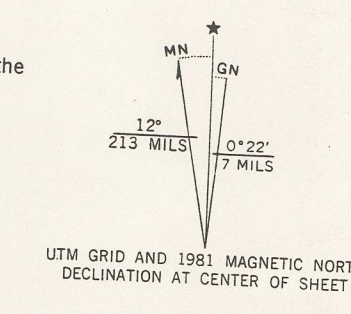


CONCEPT SKETCH OF IMPROVEMENTS

PROJECT
9703



Mapped by the Defense Mapping Agency
Edited and published by the Geological Survey
Control by NOS/NOAA and New Jersey Geodetic Survey
Topography by photogrammetric methods from aerial photographs
taken 1942 and 1943. Field checked 1943. Culture revised by the
Geological Survey 1955
Polyconic projection. 10,000-foot grid ticks based on New Jersey
coordinate system. 1000-meter Universal Transverse Mercator
grid ticks, zone 18, shown in blue. 1927 North American Datum
To place on the predicted North American Datum 1983
move the projection lines 5 meters south and 34
meters west as shown by dashed corner ticks
Red tint indicates areas in which only landmark buildings are shown
There may be private buildings within the boundaries
of the National or State reservations shown on this map



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Revisions shown in purple compiled by the Geological Survey
from aerial photographs taken 1976 and other sources
This information not field checked. Map edited 1981
Purple tint indicates extension of urban areas

ROAD CLASSIFICATION
Primary highway, all weather, hard surface. Light-duty road, all weather, improved surface.
Secondary highway, all weather, hard surface. Unimproved road, fair or dry weather.
Interstate Route U. S. Route State Route

PLAINFIELD, N. J.
N 4030-W 7422.5/7.5
1955
PHOTOREVISED 1981
DMA 8168 10 5W-SERIES 1922

CORNELL DUBILIER ELECTRONICS
SOUTH PLAINFIELD, NJ

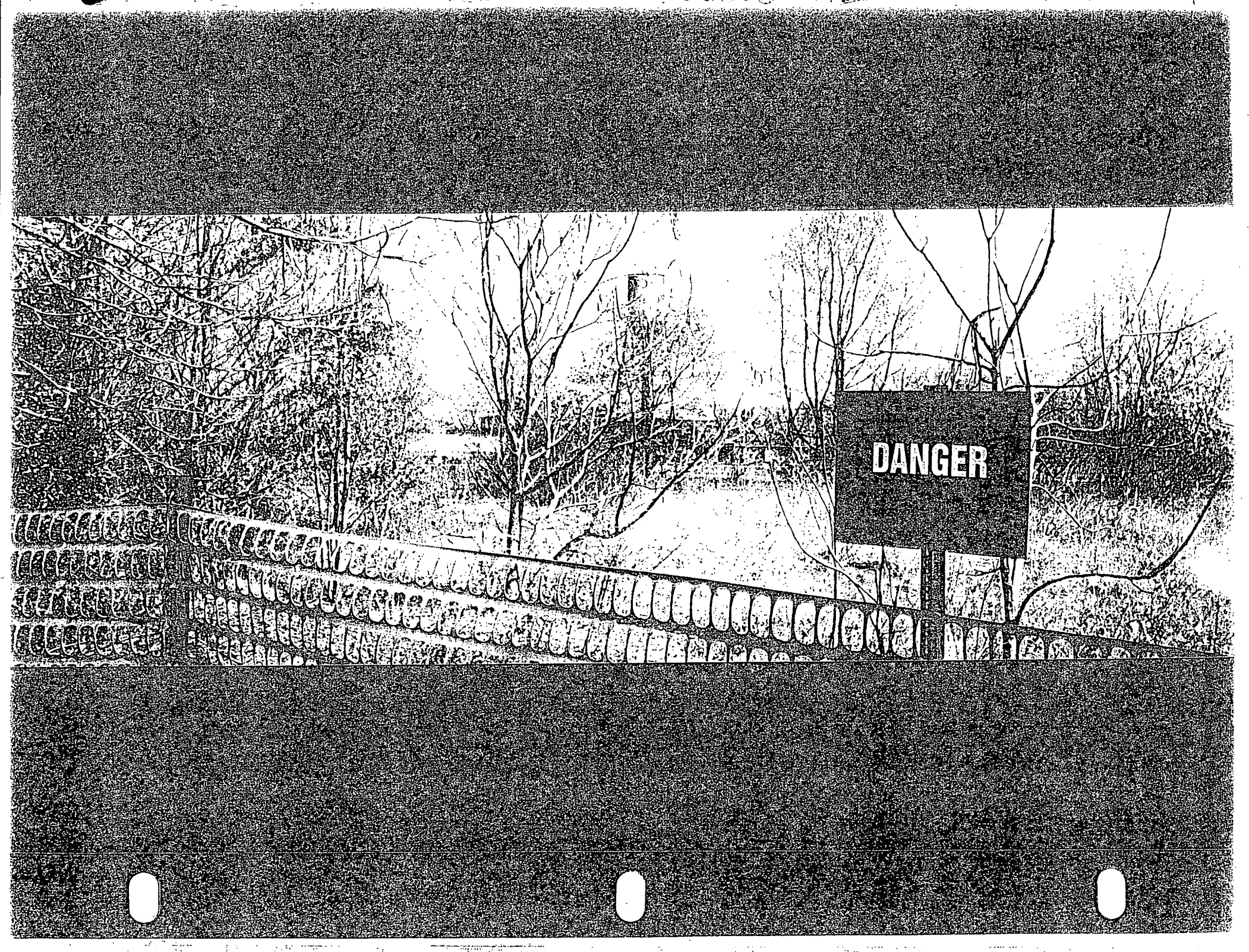
VICINITY MAP

OXFORD ENVIRONMENTAL, INC.

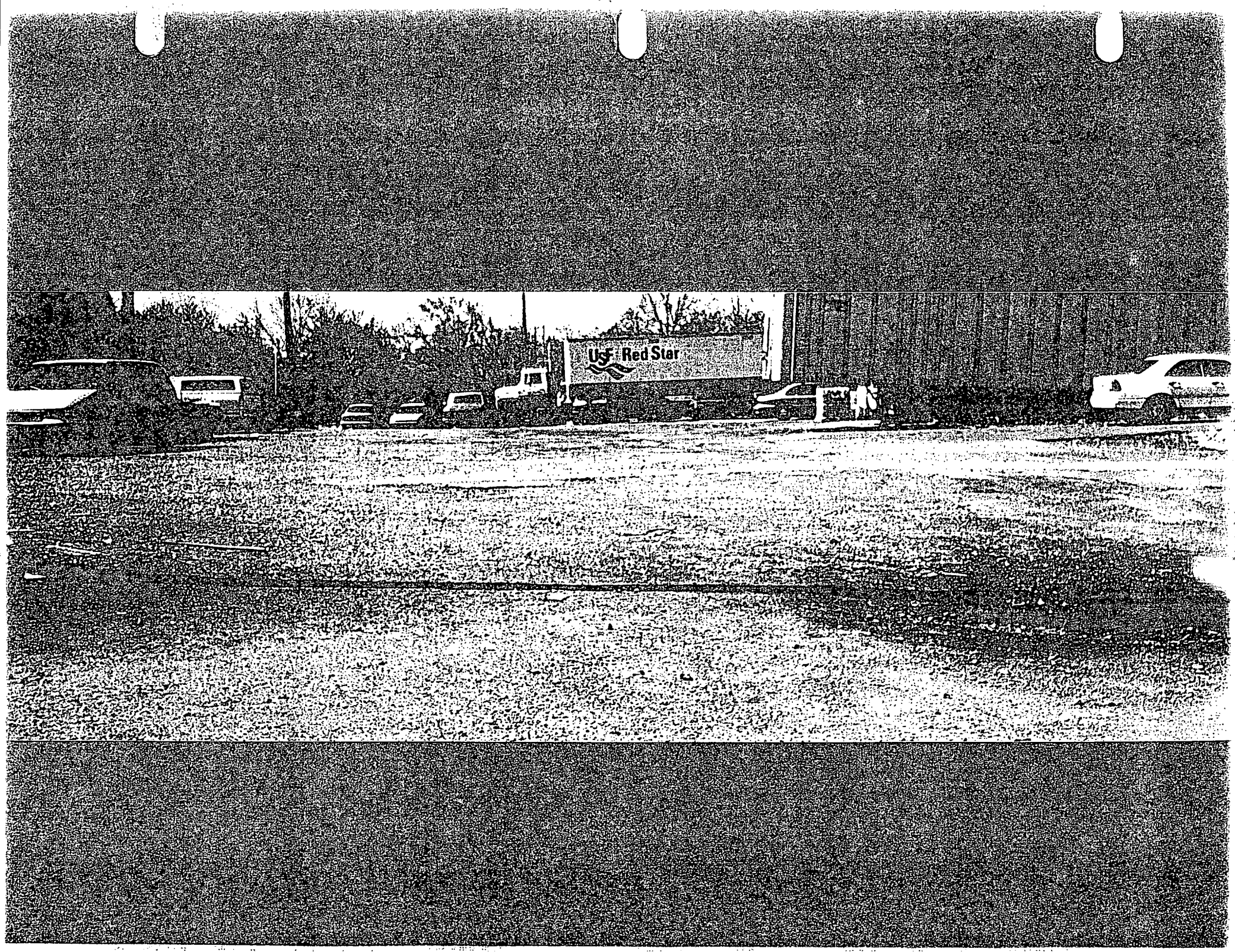
43 RT. 46 EAST, SUITE #702 PINE BROOK, NEW JERSEY

MAY 1997	PROJECT 3703
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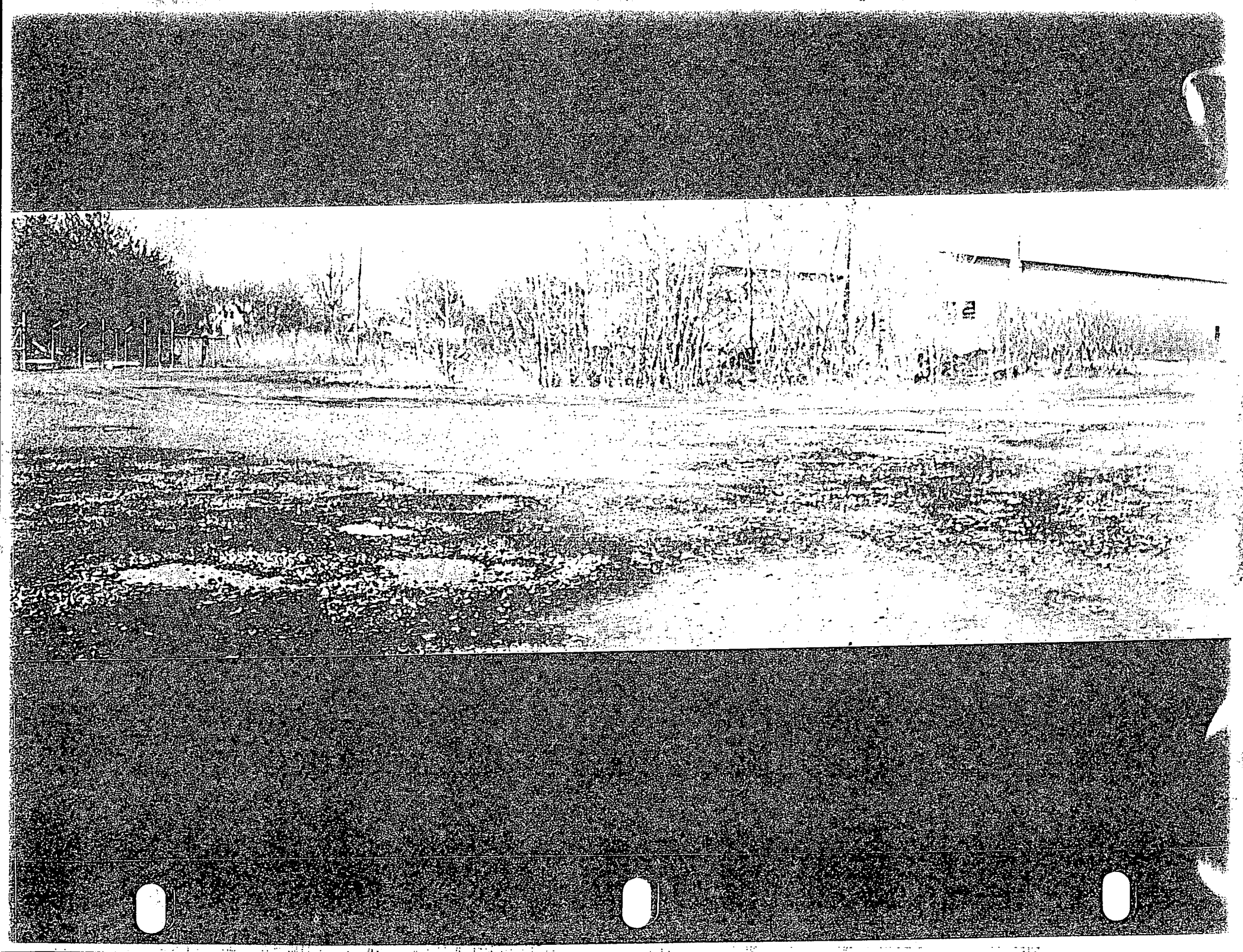
DANGER

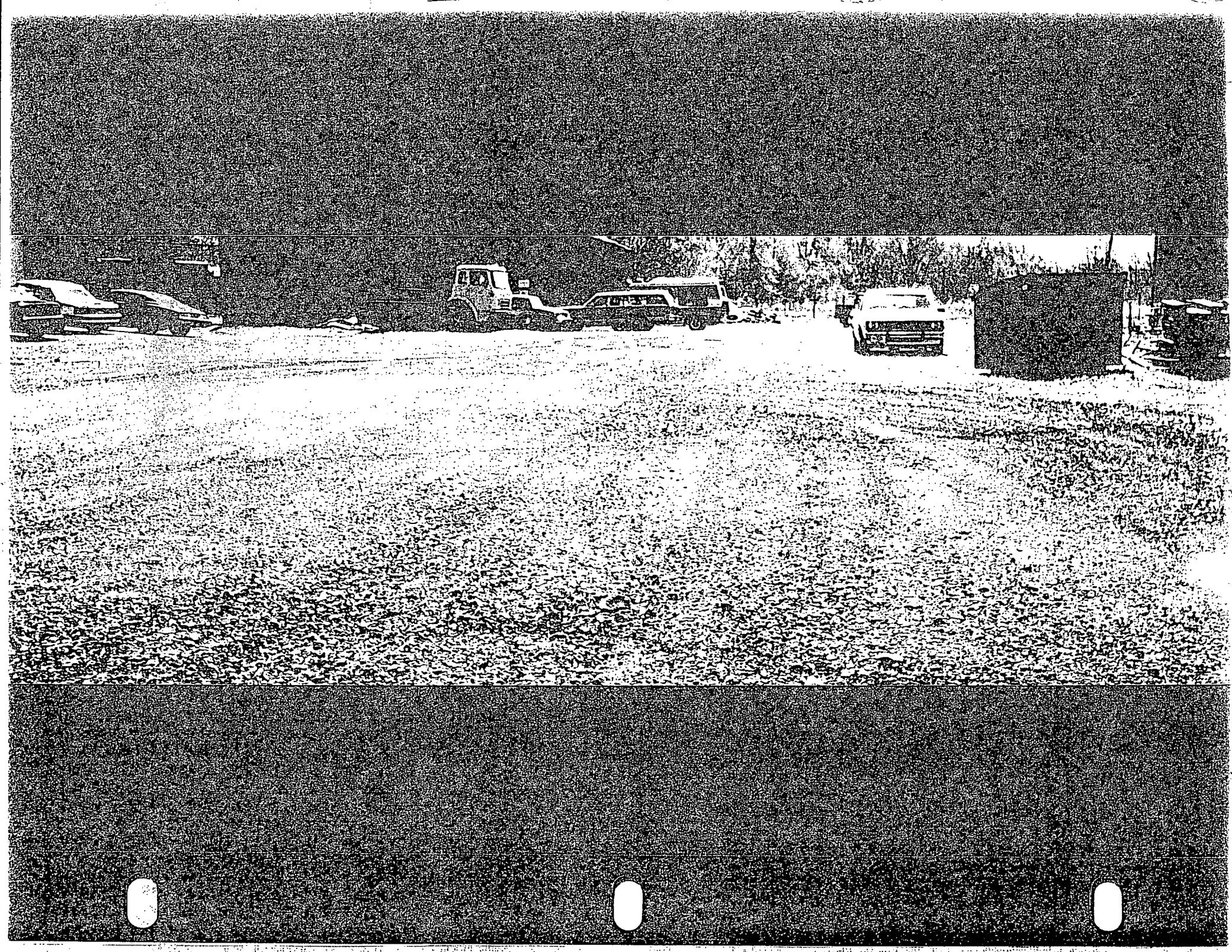


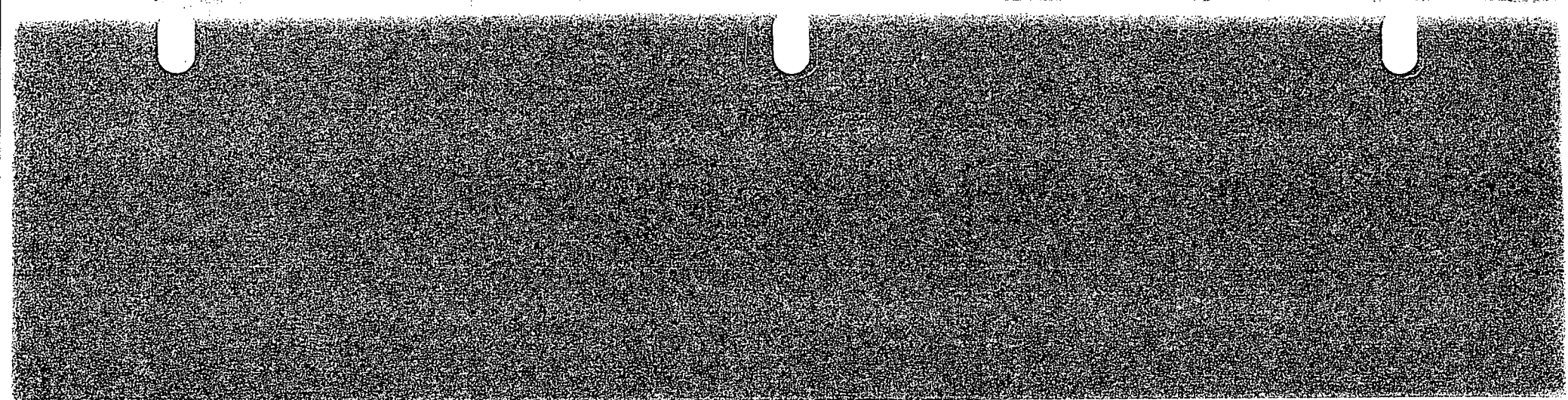




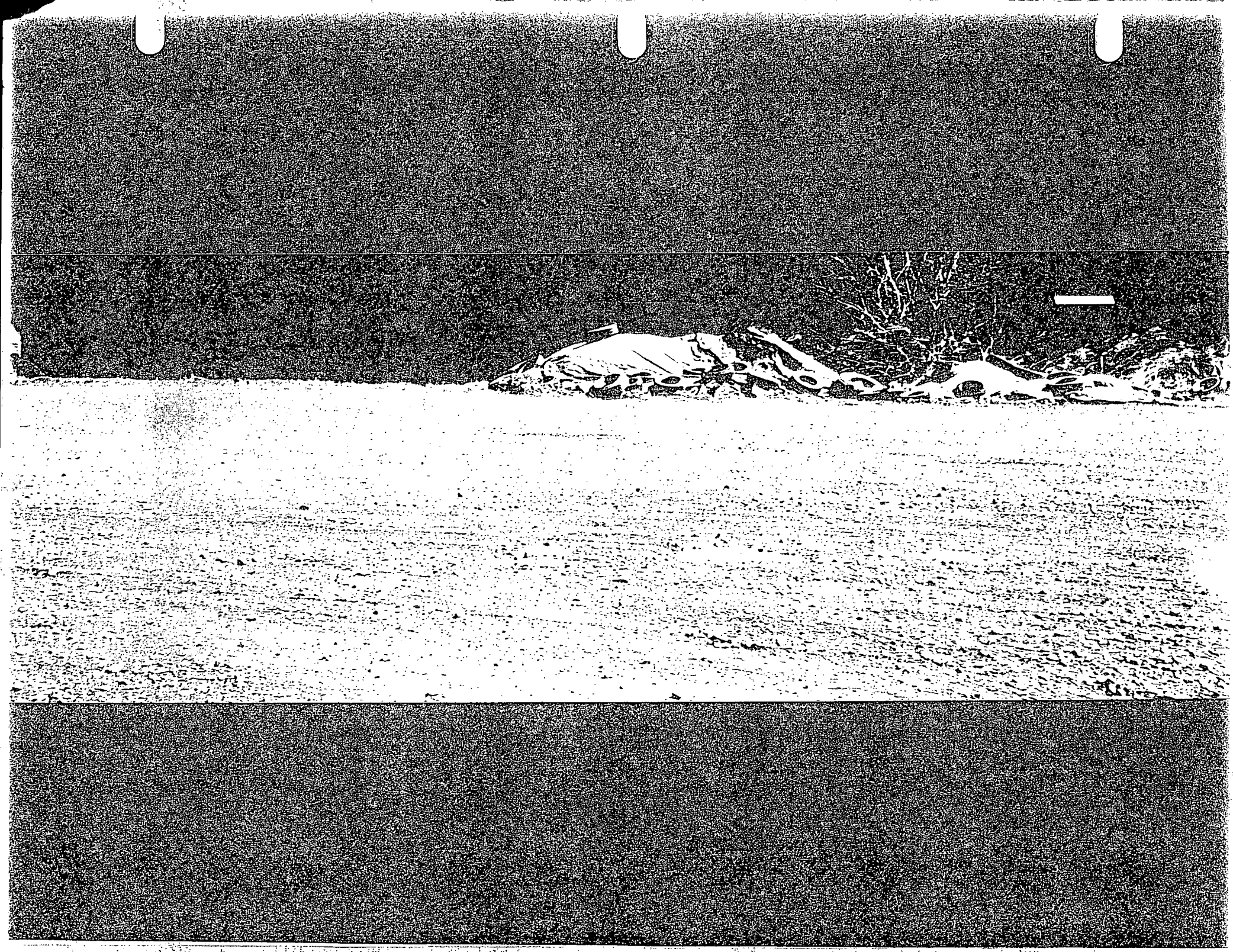














APPENDIX B

SECTION 02207

AGGREGATE MATERIALS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aggregate materials.

1.2 RELATED SECTIONS

- A. Section 01019 - Contract Considerations: Requirements applicable to unit prices for the work of this section.
- B. Section 01400 - Quality Control: Testing aggregate fill materials.
- C. Section 02205 - Soil Materials.
- D. Section 02211 - Rough Grading.
- E. Section 02223 - Backfilling.
- F. Section 02225 - Trenching.
- G. Section 02231 - Aggregate Base Course.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

- A. Section 01019 - Contract Considerations: Unit prices.
- B. Aggregate: By the cubic yard. Includes supplying aggregate materials, stockpiling.

1.4 REFERENCES

- A. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- C. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- E. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- F. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- G. ASTM D2487 - Classification of Soils for Engineering Purposes.

- H. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- I. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- J. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.5 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Materials Source: Submit name of imported materials suppliers.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with State of New Jersey Highways standards.

2 PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

- A. Coarse Aggregate Type A1: Conforming to State of New Jersey Highways standard.

2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate Type A5: Conforming to State of New Jersey Highways standard.

2.3 SOURCE QUALITY CONTROL

- A. Provide materials of each type from same source throughout the Work.

3 PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02211

ROUGH GRADING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of topsoil and subsoil.
- B. Cutting, grading, the site for site structures.

1.2 RELATED SECTIONS

- A. Section 01019 - Contract Considerations: Requirements applicable to unit prices for the work of this section.
- B. Section 01400 - Quality Control: Testing fill compaction.
- C. Section 02205 - Soil Materials.
- D. Section 02207 - Aggregate Materials.
- E. Section 02225 - Trenching: Trenching and backfilling for utilities.
- F. Section 02923 - Landscape Grading: Finish grading with topsoil to contours.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Structural Fill Type A1: By the cubic yard. Includes excavating existing subsoil, supplying structural fill materials, stockpiling, placing where required, and compacting.

1.4 REFERENCES

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10 lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ASTM C136 - Method For Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- D. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- E. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- F. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- G. ASTM D2419 - Test Method For Sand Equivalent Value of Soils and Fine Aggregate.
- H. ASTM D2434 - Test Method For Permeability of Granular Soils (Constant Head).

I. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

J. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of New Jersey Highways standards.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01700.

B. Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Fill: Type A1 as specified in Section 02207.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01039.

B. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect utilities that remain, from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect above and below grade utilities that remain.

F. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

G. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Do not excavate wet subsoil.

C. When excavating through roots, perform work by hand and cut roots with sharp axe.

- D. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 FILLING

- A. Install Work in accordance with State of New Jersey Highways standards.
- B. Fill areas to contours and elevations with unfrozen materials.
- C. Place fill material on continuous layers and compact.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.
- G. Remove surplus fill materials from site.

3.5 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Control: Field inspection and testing.
- B. Testing: In accordance with New Jersey Highway standards.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: as required by Architect/Engineer.

3.7 SCHEDULES

- A. Structural Fill:
 - 1. Fill Type A1: Maximum 6 inches compacted depth.
 - 2. Compact to minimum 95 percent of maximum density

END OF SECTION

SECTION 02231

AGGREGATE BASE COURSE

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aggregate base course.

1.2 RELATED SECTIONS

- A. Section 01019 - Contract Considerations: Requirements applicable to unit prices for the work of this section.
- B. Section 01400 - Quality Control: Inspection of bearing surfaces.
- C. Section 02207 - Aggregate Materials.
- D. Section 02211 - Rough Grading: Preparation of site for base course.
- E. Section 02223 - Backfilling: Compacted fill under base course.
- F. Section 02225 - Trenching: Compacted fill under base course.
- G. Section 02510 - Asphaltic Concrete Paving: Binder and finish asphalt courses.
- H. Section 02607 - Manholes and Covers: Manholes including frames.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Coarse Aggregate Fill Type A1: By the cubic yard. Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.4 REFERENCES

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and an 18 inch (457 mm) Drop.
- D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Blended Aggregate Fill Type A2: As specified in Section 02207.
- B. Fine Aggregate (Sand) Fill Type A3: As specified in Section 02207

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to a total compacted thickness of six inches.
- B. Place aggregate in maximum 6 inch layers and compact to specified density.
- C. Level and contour surfaces to elevations and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot (3 m) straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation From Design Elevation: Within 1/2 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection.
- B. Compaction testing will be performed in accordance with NJDOT standards.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: as required by Architect/Engineer.

3.6 SCHEDULES

A . Under Asphalt Pavement:

- 1 . Compact placed aggregate materials to achieve compaction of 100 percent.**

END OF SECTION

SECTION 02510

ASPHALTIC CONCRETE PAVING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Asphaltic concrete paving, wearing binder or base course.
- B. Surface sealer.
- C. Aggregate base course.

1.2 RELATED SECTIONS

- A. Section 02211 - Rough Grading: Preparation of site for paving.
- B. Section 02223 - Backfilling: Compacted subbase for paving.
- C. Section 02607 - Manholes and Covers: Manholes including frames.
- D. Section 09900 - Painting: Pavement markings.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Asphalt Pavement Mix (Base Course): By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.
- B. Asphalt Pavement Mix (Wearing Course): By the ton. Includes preparing base, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.
- C. Seal Coat: By the square yard. Includes preparing surfaces and applying.

1.4 REFERENCES

- A. ASTM D946 - Penetration-Graded Asphalt Cement for Use in Pavement Construction.
- B. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
- C. TAI - (The Asphalt Institute) - MS-3 Asphalt Plant Manual.
- D. TAI - (The Asphalt Institute) - MS-8 Asphalt Paving Manual.
- E. TAI - (The Asphalt Institute) - MS-19 Basic Asphalt Emulsion Manual.

1.5 PERFORMANCE REQUIREMENTS

- 1.6 Paving: Designed for parking or movement of trucks up to 60,000 lbs.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with NJDOT standard.
- B. Mixing Plant: Conform to NJDOT standard.
- C. Obtain materials from same source throughout.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for paving work on property.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- B. Place bitumen mixture when temperature is not more than 15 degrees F below bitumen suppliers bill of lading and not more than maximum specified temperature.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Asphalt Cement: In accordance with NJDOT standards.
- B. Aggregate for Base Course Mix: In accordance with NJDOT standards.
- C. Aggregate for Wearing Course Mix: In accordance with NJDOT standards.
- D. Fine Aggregate: In accordance with NJDOT standards.
- E. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
- F. Primer: In accordance with NJDOT standards.
- G. Tack Coat: In accordance with NJDOT standards.
- H. Seal Coat: TAI MS-19, sand type.

2.2 ASPHALT PAVING MIX

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with NJDOT standards.
- C. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with NJDOT standards.

2.3 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01400 - Quality Control: Provide mix design for asphalt.
- B. Submit proposed mix design for review prior to beginning of work.

- C. Test samples in accordance with NJDOT standards.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify base conditions under provisions of Section 01039.
- B. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct.

3.2 SUBBASE

- A. Section 02231 - Aggregate Base Course forms the base construction for work of this section.

3.3 PREPARATION - PRIMER

- A. Apply primer in accordance with manufacturer's instructions.
- B. Apply primer to contact surfaces of curbs, gutters.
- C. Use clean sand to blot excess primer.

3.4 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with [manufacturer's instructions.
- B. Apply tack coat to contact surfaces of curbs, gutters and base.
- C. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these.

3.5 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

- A. Place asphalt binder course within 24 hours of applying primer or tack coat.
- B. Place binder course to thickness identified in schedule at end of Section.
- C. Place wearing course within two hours of placing and compacting binder course.
- D. Place wearing course to [thickness identified in schedule at end of section]
- E. Install manhole frames in correct position and elevation.
- F. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- G. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.6 CURBS

- A. Install extruded asphalt curbs of profile as indicated.

3.7 SEAL COAT

- A. Apply seal coat to surface course in accordance with NJDOT standards.

3.8 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Variation from True Elevation: Within 1/2 inch.

3.9 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Control: Provide field inspection and testing.
- B. Take samples and perform tests in accordance with NJDOT standards.

3.10 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for two days or until surface temperature is less than 140 degrees F (60 degrees C).

3.11 SCHEDULES

- A. Pavement at Truck Ramps, Truck Parking Areas, Driveways and Garbage Areas: Thickness and compaction of courses to support vehicles up to 60,000 lb.
- B. Pavement at Parking Areas for Automobiles: Two courses; stabilized base course of four inch compacted thickness and surface course of 2 inch compacted thickness.
- C. Pavement Front Sidewalks: Thickness and compaction of subbase to support moderate pedestrian traffic.

END OF SECTION

SECTION 02607

MANHOLES AND COVERS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Modular precast concrete manhole sections with tongue-and-groove joints [with masonry transition to lid frame,] covers, anchorage, and accessories.

1.2 RELATED SECTIONS

- A. Section 02222 - Excavating: Excavating for manholes and base pads.
- B. Section 02223 - Backfilling: Backfilling after manhole installation.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Manhole: By the unit. Includes excavating, concrete base pad, concrete manhole sections, masonry transition to cover frame, cover frame and cover, to indicated depth, forming and sealing pipe inlets and outlets.

1.4 REFERENCES

- A. ASTM A48 - Gray Iron Castings.
- B. ASTM C55 - Concrete Building Brick.
- C. ASTM C62 - Building Brick (Solid Masonry Units Made From Clay or Shale).
- D. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- E. ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- F. ASTM D3753 - Glass Fiber-Reinforced Polyester Manholes.
- G. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate manhole locations, elevations, sizes and elevations of penetrations.
- C. Product Data: Provide manhole covers, component construction, features, configuration, dimensions.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of masonry work.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Manhole Sections: In accordance with NJDOT standards.
- B. Concrete Brick Units: In accordance with NJDOT standards.
- C. Mortar and Grout: In accordance with NJDOT standards.
- D. Reinforcement: In accordance with NJDOT standards.

2.2 COMPONENTS

- A. Lid and Frame: In accordance with NJDOT standards.
- B. Manhole Steps: In accordance with NJDOT standards.
- C. Base Pad: In accordance with NJDOT standards.
- D. Strap Anchors: In accordance with NJDOT standards.

2.3 CONFIGURATION

- A. Shaft Construction: Concentric with concentric cone top section; lipped male/female joints; sleeved to receive pipe sections.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter.
- D. Design Depth: As indicated.
- E. Clear Lid Opening: 26 inches diameter.
- F. Pipe Entry: Provide openings as required.
- G. Steps: As required by code.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation for manholes is correct.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.3 PLACING MANHOLE SECTIONS

- A. Place base pad, trowel top surface level.
- B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.
- C. Cut and fit for pipe sleeves.
- D. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- E. Set cover frames and covers level without tipping, to correct elevations.
- F. Coordinate with other sections of work to provide correct size, shape, and location.

3.4 SCHEDULES

- A. Storm Sewer Manholes: Precast concrete sections, galvanized steel steps, 48 inch (1200 mm) inside dimension, to depth indicated, with lid.

END OF SECTION

SECTION 02722

SITE STORM SEWERAGE SYSTEMS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Site storm sewerage drainage piping, fittings and accessories, and bedding.
- B. Catch basins, paved area drainage, site surface drainage, detention basin.

1.2 RELATED SECTIONS

- A. Section 02225 - Trenching 02222 - Excavating: Excavating for sewer system piping and detention basin.
- B. Section 02225 - Trenching 02223 - Backfilling: Backfilling over piping up to subgrade elevation.
- C. Section 02607 - Manholes and Covers.

1.3 UNIT PRICE - BASIS OF MEASUREMENT

- A. Pipe and Fittings: By the linear foot. Includes hand trimming, excavating, bedding, pipe and fittings, granular cover, connecting to building service piping.
- B. Catch Basin and Cleanout: By the unit for a nominal depth of six feet. Includes hand trimming, excavating, bedding, unit installation with accessories, connecting to sewer piping.

1.4 REFERENCES

- A. AASHTO M36 - Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.
- B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- C. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- D. ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- E. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- F. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- G. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- H. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- I. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- J. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

- K. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- L. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- M. ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- N. ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
- O. ASTM D3033 - Type PSP Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- P. ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- Q. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- R. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- S. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data indicating pipe, pipe accessories.

1.6 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.7 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01700 - Contract Closeout: Procedures for submittals.
- B. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of the Work of this section.

2 PART 2 PRODUCTS

- A. SEWER PIPE MATERIALS
- B. Plastic Pipe: ASTM D2729, polyvinyl chloride (PVC) material; inside nominal diameter of inches (mm), bell and spigot solvent sealed joint end.

2.2 ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- B. Filter Fabric: Non-biodegradable, manufactured by Mirafi.
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service" in large letters.
- D. Grout: To meet NJDOT specifications.

2.3 CATCH BASINS AND PLANT AREA DRAINS

- A. Lid and Frame: Cast iron construction, hinged lid, manufactured by Campbell:
 - 1. Lid Design: Linear grill.
 - 2. Nominal Lid and Frame Size: per NJDOT specifications.
- B. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, nominal shaft diameter of 48 inches.
- C. Base Pad: Cast-In-Place Concrete of type specified in Section 03300.

2.4 CLEANOUTS

- A. Cleanout Lid and Frame: Cast iron construction, hinged lid, manufactured by Campbell:
 - 1. Lid Design: Linear grill.
 - 2. Nominal Lid and Frame Size: per NJDOT requirements.
- B. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, nominal shaft diameter of 48 inches.
- C. Base Pad: Cast-In-Place Concrete of type specified in Section 03300.

2.5 BEDDING AND COVER MATERIALS

- A. Bedding: Fill Type A1 as specified in Section 02207.
- B. Cover: Fill Type A1, as specified in Section 02207.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 02225 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.
- B. Place pipe on minimum 6 inch deep bed of Type A1 filter aggregate.
- C. Lay pipe to slope gradients noted on drawings with maximum variation from true slope of $\frac{1}{8}$ inch in 10 feet.
- D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches, compact to 95 percent.
- E. Refer to Section 02225 for trenching requirements. Do not displace or damage pipe when compacting.
- F. Refer to Section 02607 for manhole requirements.
- G. Connect to manholes through installed sleeves.
- H. Install trace wire continuous over top of pipe.

3.5 INSTALLATION - CATCH BASINS AND CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place Cast-In-Place Concrete base pad, with provision for storm sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- D. Establish elevations and pipe inverts for inlets and outlets as indicated.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection and testing.
- B. Request inspection prior to and immediately after placing aggregate cover over pipe.
- C. Compaction testing will be performed in accordance with NJDOT requirements.

- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Tests: per NJDOT requirements.
- F. Infiltration Test: Test in accordance with applicable code.
- G. Deflection Test: Test in accordance with applicable code.
- H. Pressure Test: Test in accordance with applicable code.

3.7 PROTECTION

- A. Protect finished Work under provisions of Section 01500.

Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases; concrete foundation for posts, and center drop for gates.
- C. Manual gates and related hardware.
- D. RELATED SECTIONS- not used

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fencing: By the linear foot to the fence height specified, based on the specified post spacing. Includes posts, rails, tension wire, fabric, accessories, attachments.
- B. Post Footings: Each unit footing, to the depth specified. Includes excavation, concrete placed, finishing.
- C. Gates: By the square foot Each specified type. Includes frame posts, fabric, accessories, hardware.

1.3 REFERENCES

- A. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- B. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire.
- C. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- F. ASTM A428 - Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- G. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- H. ASTM A491 - Aluminum-Coated Steel Chain Link Fence Fabric.
- I. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- J. ASTM A585 - Aluminum Coated Steel Barbed Wire.
- K. ASTM C94 - Ready-mixed Concrete.
- L. ASTM F567 - Installation of Chain-Link Fence.

- M. ASTM F573 - Residential Zinc-Coated Steel Chain Link Fence Fabric.
- N. ASTM F668 - Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
- O. ASTM F669 - Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
- P. ASTM F1083 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- Q. ASTM F1234 - Protective Coatings on Steel Framework for Fences.
- R. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

1.4 SYSTEM DESCRIPTION

- A. Fence Height: as indicated on Drawings.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to NJDOT standards.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

1.6 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Manufacturer's Installation Instructions: Indicate installation requirements.

1.7 SUBMITTALS FOR CLOSEOUT

- A. Section 01700 - Contract Closeout: Procedures for submittals.
- B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with NJDOT standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years experience.

2 PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Materials and Components: Conform to NJDOT standards.
- B. Fabric Size: Conform to NJDOT standards.
- C. Intermediate Posts: Conform to NJDOT standards
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Conform to NJDOT standards.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with manufacturer's instructions.
- B. Place fabric on outside of posts and rails.
- C. Set posts plumb, in concrete footings with top of footing 2 inches (50 mm) above finish grade. Slope top of concrete for water runoff.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch (150 mm) long rail sleeves.
- H. Install brace rail on corner gate leaves.
- I. Do not stretch fabric until concrete foundation has cured 28 days.
- J. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.
- K. Position bottom of fabric 2 inches (50 mm) above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches (380 mm) on centers.
- M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- N. Install bottom tension wire stretched taut between terminal posts.
- O. Install support arms sloped inward and attach barbed wire; tension and secure.
- P. Do not attach the hinged side of gate from building wall; provide gate posts.
- Q. Install gate with fabric to match fence. Install three hinges per leaf, latch, catches.
- R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

3.2 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm).
- B. Maximum Offset From True Position: 1 inch (25 mm).
- C. Components shall not infringe adjacent property lines.

3.3 SCHEDULES

- A. Property Perimeter: 6 feet (1.8 m) high, aluminized coated fabric, single strand barbed wire top, on 45 degree sloped arms, pointing out.

END OF SECTION

SECTION 02722

SITE STORM SEWERAGE SYSTEMS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Site storm sewerage drainage piping, fittings and accessories, and bedding.
- B. Catch basins, paved area drainage, site surface drainage, detention basin.

1.2 RELATED SECTIONS

- A. Section 02225 - Trenching 02222 - Excavating: Excavating for sewer system piping and detention basin.
- B. Section 02225 - Trenching 02223 - Backfilling: Backfilling over piping up to subgrade elevation.
- C. Section 02607 - Manholes and Covers.

1.3 UNIT PRICE - BASIS OF MEASUREMENT

- A. Pipe and Fittings: By the linear foot. Includes hand trimming, excavating, bedding, pipe and fittings, granular cover, connecting to building service piping.
- B. Catch Basin and Cleanout: By the unit for a nominal depth of six feet. Includes hand trimming, excavating, bedding, unit installation with accessories, connecting to sewer piping.

1.4 REFERENCES

- A. AASHTO M36 - Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.
- B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- C. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- D. ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- E. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- F. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- G. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- H. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- I. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- J. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

- K. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- L. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- M. ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- N. ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
- O. ASTM D3033 - Type PSP Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- P. ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- Q. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- R. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- S. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data indicating pipe, pipe accessories.

1.6 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.7 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01700 - Contract Closeout: Procedures for submittals.
- B. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.

1.8 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of the Work of this section.

2 PART 2 PRODUCTS

- A. SEWER PIPE MATERIALS
- B. Plastic Pipe: ASTM D2729, polyvinyl chloride (PVC) material; inside nominal diameter of inches (mm), bell and spigot solvent sealed joint end.

2.2 ACCESSORIES

- A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- B. Filter Fabric: Non-biodegradable, manufactured by Mirafi.
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service" in large letters.
- D. Grout: To meet NJDOT specifications.

2.3 CATCH BASINS AND PLANT AREA DRAINS

- A. Lid and Frame: Cast iron construction, hinged lid, manufactured by Campbell:
 - 1. Lid Design: Linear grill.
 - 2. Nominal Lid and Frame Size: per NJDOT specifications.
- B. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, nominal shaft diameter of 48 inches.
- C. Base Pad: Cast-In-Place Concrete of type specified in Section 03300.

2.4 CLEANOUTS

- A. Cleanout Lid and Frame: Cast iron construction, hinged lid, manufactured by Campbell:
 - 1. Lid Design: Linear grill.
 - 2. Nominal Lid and Frame Size: per NJDOT requirements.
- B. Shaft Construction and Concentric Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints, nominal shaft diameter of 48 inches.
- C. Base Pad: Cast-In-Place Concrete of type specified in Section 03300.

2.5 BEDDING AND COVER MATERIALS

- A. Bedding: Fill Type A1 as specified in Section 02207.
- B. Cover: Fill Type A1, as specified in Section 02207.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 02225 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal joints watertight.
- B. Place pipe on minimum 6 inch deep bed of Type A1 filter aggregate.
- C. Lay pipe to slope gradients noted on drawings with maximum variation from true slope of 1/8 inch in 10 feet.
- D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches, compact to 95 percent.
- E. Refer to Section 02225 for trenching requirements. Do not displace or damage pipe when compacting.
- F. Refer to Section 02607 for manhole requirements.
- G. Connect to manholes through installed sleeves.
- H. Install trace wire continuous over top of pipe.

3.5 INSTALLATION - CATCH BASINS AND CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place Cast-In-Place Concrete base pad, with provision for storm sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- D. Establish elevations and pipe inverts for inlets and outlets as indicated.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection and testing.
- B. Request inspection prior to and immediately after placing aggregate cover over pipe.
- C. Compaction testing will be performed in accordance with NJDOT requirements.

- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Tests: per NJDOT requirements.
- F. Infiltration Test: Test in accordance with applicable code.
- G. Deflection Test: Test in accordance with applicable code.
- H. Pressure Test: Test in accordance with applicable code.

3.7 PROTECTION

- A. Protect finished Work under provisions of Section 01500.

Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

STANDARD
FOR
PERMANENT VEGETATIVE COVER FOR SOIL STABILIZATION

Definition

Establishment of permanent vegetative cover on exposed soils where perennial vegetation is needed for long term protection.

Purpose

To permanently stabilize the soil, assuring conservation of soil and water, and to enhance the environment.

Where Applicable

On exposed soils that have a potential for causing off-site environmental damage.

Methods and Materials

I. Site Preparation

- A. Grade as needed and feasible to permit the use of conventional equipment for seedbed preparation, seeding, mulch application and anchoring, and maintenance. All grading should be done in accordance with Standards for Land Grading, p. 4.11.
- B. Install needed erosion control practices and facilities such as diversions, grade stabilization structures, channel stabilization measures, sediment basins, and waterways. See Standards 4.2 through 4.16.

II. Seedbed Preparation

- A. Apply limestone and fertilizer according to soil test recommendations such as those offered by Rutgers University Soil Testing Laboratory. Soil sample mailers are available from the local Cooperative Extension Service office. If soil testing is not feasible on small or variable sites, or where timing is critical, fertilizer may be applied at the rate of 500 pounds per acre or 11 pounds per 1,000 square feet of 10-20-10 or equivalent. In addition, 300 pounds 38-0-0 per acre or equivalent of slow release nitrogen may be used in lieu of topdressing (see page 3.2.7, Section IV). Apply limestone (equivalent to 50 percent calcium plus magnesium oxides) as follows: ^{1/}

SOIL TEXTURE	TONS/ACRE	LBS./1,000 SQ. FT.
Clay, clay loam, and high organic soil	4	180
Sandy loam, loam, silt loam	3	135
Loamy sand, sand	2	90

Pulverized dolomitic limestone is preferred for most soils south of the New Brunswick-Trenton line.

- B. Work lime and fertilizer into the soil as nearly as practical to a depth of 4 inches with a disc, springtooth harrow, or other suitable equipment. The final harrowing or discing operation should be on the general contour. Continue tillage until a reasonably uniform, fine seedbed is prepared. All but clay or silty soils and coarse sands should be rolled to firm the seedbed wherever feasible.
- C. Remove from the surface all stones two inches or larger in any dimension. Remove all other debris, such as wire, cable, tree roots, pieces of concrete, clods, lumps, or other unsuitable material.
- D. Inspect seedbed just before seeding. If traffic has left the soil compacted, the area must be retilled and firmed as above.

^{1/} Acid soil conditions:

Soils having a pH of 4 or less or containing iron sulfide shall be covered with a minimum of 12 inches of soil having a pH of 5 or more before seedbed preparation. The added soil shall be limed as above.

III. Seeding

- A. Select a mixture from Table 3.2-1 or use mixture recommended by the Cooperative Extension Service or Soil Conservation Service which is approved by the Soil Conservation District.
- B. Apply seed uniformly by hand, cyclone (centrifugal) seeder, drop seeder, drill, cultipacker seeder, or hydroseeder. The latter may be justifiable for large, steep areas where conventional vehicles cannot travel. Mulch shall not be included in the tank with the seed. Except for drilled, hydroseeded or cultipacked seedings, seed shall be incorporated into the soil, to a depth of 1/4 to 1/2 inch, by raking or dragging. Depth of seed placement may be 1/4 inch deeper on coarse textured soil.
- C. After seeding, firming the soil with a corrugated roller will assure good seed-to-soil contact, restore capillarity, and improve seedling emergence. This is the preferred method. When performed on the contour, sheet erosion will be minimized and water conservation on site will be maximized.

IV. Mulching

Mulching is required on all seeding. Mulch will insure against erosion before grass is established and will promote faster and earlier establishment. (The existence of satisfactory permanent vegetation at the time of project or unit completion shall be deemed as compliance with this mulching requirement.)

- A. Mulch materials should be unrotted small grain straw, hay free of seeds, or salt hay to be applied at the rate of 1-1/2 to 2 tons per acre (70 to 90 pounds per 1,000 square feet), except that where a crimper is used instead of a liquid mulch-binder (tackifying or adhesive agent), the rate of application must be double the lower rate. Mulch chopper-blowers must not grind the material.
- B. Spread uniformly by hand or mechanically so that approximately 75% to 95% of the soil surface will be covered. For uniform distribution of hand-spread mulch, divide area into approximately 1,000 square foot sections and distribute 70 to 90 pounds within each section.
- C. Mulch anchoring should be accomplished immediately after placement to minimize loss by wind or water. This may be done by one of the following methods, depending upon the size of the area, steepness of slopes, and costs.
 1. Peg and Twine - Drive 8 to 10 inch wooden pegs to within 2 to 3 inches of the soil surface every 4 feet in all directions. Stakes may be driven before or after applying mulch. Secure mulch to soil surface by stretching twine between pegs in a criss-cross and a square pattern. Secure twine around each peg with two or more round turns.
 2. Mulch Nettings - Staple paper, jute, cotton, or plastic nettings to the soil surface. Use a degradable netting in areas to be mowed.
 3. Crimper (mulch anchoring tool) - A tractor-drawn implement, somewhat like a disc-harrow, especially designed to push or cut some of the broadcast long fiber mulch 3 to 4 inches into the soil so as to anchor it and leave part standing upright. This technique is limited to areas traversable by a tractor, which must operate on the contour of slopes. Straw mulch rate must be 3 tons per acre. No tackifying or adhesive agent is required.
 4. Liquid Mulch-Binders - May be used to anchor salt hay, hay, or straw mulches.
 - a. Applications should be heavier at edges where wind catches the mulch, in valleys, and at crests of banks. Remainder of area should be uniform in appearance.
 - b. Use one of the following:
 - (1) Emulsified asphalt - (SS-1, CSS-1, CMS-2, MS-2, RS-1, RS-2, CRS-1, and CRS-2).
Apply 0.04 gal./sq./yd. or 194 gal./acre on flat slopes less than 8 feet high. On slopes 8 feet or more high, use 0.075 gal./sq. yd. or 363 gal./acre.

(2) Cutback asphalt - rapid curing (RC-70, RC-250, and RC-800) or medium curing (MC-250 or MC-800).
Apply 0.04 gal./sq. yd. or 194 gal./acre on flat areas and on slopes less than 8 feet high. On slopes 8 feet or more high, use 0.075 gal./sq. yd. or 363 gal./acre.

(3) Synthetic or Organic binders - binders such as Curasol, DCA-70, Petro-set, and Terra-Tack may be used at rates recommended by the manufacturer to anchor mulch materials.

NOTE: All names given above are registered trade names. This does not constitute a recommendation of these products to the exclusion of other products.

D. Wood-fiber or paper-fiber mulch at the rate of 1,500 pounds per acre may be applied by a hydroseeder. Use is limited to flatter slopes and during optimum seeding periods in spring and fall.

V. Irrigation (where feasible)

If soil moisture is deficient, and mulch is not used, supply new seedlings with adequate water (a minimum of 1/4 inch twice a day until vegetation is well established). This is especially true when seedlings are made in abnormally dry or hot weather or on droughty sites.

VI. Topdressing*

A. Spring seedlings will require an application of fertilizer such as 10-10-10 or equivalent at 400 pounds per acre or 10 pounds per 1,000 square feet between September 1 and October 15.

B. Fall seedlings will require the above between March 15 and May 1.

C. Mixtures dominated by Weeping lovegrass or legumes may not need topdressing.

D. Bermudagrass should be topdressed before August 15.

*If slow release nitrogen (300 pounds 38-0-0 per acre or equivalent) is used in addition to suggested fertilizer, this follow-up of topdressing is not mandatory.

TABLE 3.2-1

SOILS, SEED MIXTURES, AND DATES FOR PERMANENT SEEDINGS FOR SOIL STABILIZATION

SOILS & SITES	SEED MIXTURE 1/ Normal Seeding Depth Is from 1/4-1/2 inch except A-3, A-4, A-7	MINIMUM SEEDING RATES 2/ (pounds)		OPTIMUM SEEDING DATES Based on Plant Hardiness Zone 3/ (see page 3.2.6)		
		Per Acre	Per 1,000 Sq. Ft.	ZONE 5	ZONE 6	ZONE 7
A. Well to Excessively Well Drained						
1. Unmowed areas, e.g. landfills, rights of way, wildlife areas	Weeping lovegrass Sericea lespedeza	2 20	0.1 0.5	--	--	3/1-8/1
2. Unmowed, coarse textured soils, wildlife areas; make good forage	Switchgrass	25	0.6	5/1-7/1	4/1-6/1	4/1-6/1
3. Unmowed areas	Weeping lovegrass 1/2-1", Crownvetch	3 12	0.1 0.3	--	--	3/1-8/1
4. Best for coarse textured soils; suppresses woody growth; unmowed areas	Weeping lovegrass 1/2-1", flatpea	3 30	0.1 0.7	--	--	3/1-8/1
5. Unmowed areas, e.g. road banks, gravel pits, etc.	Perennial ryegrass Crownvetch Spreading fescue	25 12 25	0.6 0.3 0.6	3/15-6/1 8/1-9/15	3/1-5/15 8/15-10/1	2/15-5/1 8/15-10/15
6. Landfills, coarse textured soils; unmowed areas	Hard fescue/or Sheep fescue Perennial ryegrass	45 10	1.0 0.2	3/15-6/1 8/1-9/15	3/1-5/15 8/15-10/1	2/15-5/1 8/15-10/15
7. Mowed areas, e.g. lawns, recreation areas	Bermudagrass Zoysiagrass	12 Bushel sprigs spaced at 2' - 3' centers		--	--	5/1-7/15
B. Moderately to Well Drained	Mixtures A-1 through A-7 and the following:					
1. Low maintenance areas, e.g. detention basins, landfills, dikes, diversions (sun to open shade)	Tall fescue Spreading fescue Kentucky bluegrass	30 30 30	0.7 0.7 0.7	3/15-5/15 8/1-9/1	3/1-5/15 8/15-10/1	2/15-5/1 8/15-10/15
2. Unmowed areas (aesthetics not important)	Tall fescue Sericea lespedeza	25 20	0.6 0.4	3/15-6/1 --	3/1-5/15 --	2/15-5/1 8/15-10/15

TABLE 3.2-1 (continued)

3. Low maintenance areas, occasional mowing only	Tall fescue Birdsfoot trefoil	45 10	1.0 0.2	3/15-6/1	3/1-5/15	--
4. Mowed areas, e.g. recreation areas, lawns, etc. (sun and shade)	Spreading fescue Red fescue Kentucky bluegrass Perennial ryegrass	15 15 25 10	0.3 0.3 0.6 0.2	3/15-6/1 8/1-9/15	3/1-5/15 8/15-10/1	2/15-5/1 8/15-10/15 (shade and cool sites only)
5. Mowed areas, e.g. lawns (sunny sites) (high maintenance, aesthetic areas)	Kentucky bluegrass (three cultivar blend) Hard fescue Perennial ryegrass	60 20 10	1.4 0.4 0.2	3/15-6/1	3/1-5/15	--
C. Poorly to Somewhat Poorly Drained	Mixtures B-1, B-3, B-4 and B-5 and the following:					
1. Mowed and unmowed sunny wet areas, e.g. ditch banks, waterways	Reed canarygrass Redtop Perennial ryegrass	20 4 20	0.4 0.1 0.4	3/15-6/1 8/1-9/15	3/1-5/15 8/15-10/1	1/15-5/1 8/15-10/15 (Be sure that Reed canarygrass seed is from new seed crop)

NOTES:

- 1/ Seeding mixtures and/or rates not listed above may be used if recommended by the local Soil Conservation District, Soil Conservation Service; recommendations of the Cooperative Extension Service may be used if approved by the Soil Conservation District. Legumes (flatpea, crown-vetch, trefoil, lespedeza) should be mixed with proper inoculant prior to planting.
- 2/ Grass seed mixture checked by the chief of the Bureau of Seed Certification, New Jersey Department of Agriculture, Trenton, New Jersey, will assure the purchaser that the mixture obtained is the mixture ordered.
- 3/ Plant Hardiness Zone (see map, p. 3.2.6)

Zone 5 - Portions of Sussex and Warren Counties

Zone 6 - Portions of Bergen, Camden, Essex and Gloucester, all of Hunterdon, portions of Mercer and Middlesex, all of Morris and Passaic, portions of Somerset, Sussex, Union and Warren Counties

Zone 7 - Atlantic, portion of Bergen, all of Burlington, Cape May and Cumberland, portions of Essex and Gloucester, all of Hudson, portion of Middlesex, all of Monmouth, Ocean and Salem and portion of Union County

RECOMMENDED CULTIVARS

BERMUDAGRASS

Midland
Midiron

REED CANARYGRASS

loreed

SWITCHGRASS

Blackwell

PERENNIAL RYEGRASS

Repel
Pennant
Citation
Diplomat
Or other Improved
cultivars

KENTUCKY BLUEGRASS

Kenblue
Park
Arboretum
Touchdown
America
Baron

CROWN VETCH

Pennlift
Chemung

BIRDSFOOT TREEFOIL

Viking
Empire

CHEWING'S FESCUE

Banner
Jamestown

TALL FESCUE

Kentucky-31
Rebel
Falcon

SPREADING FESCUE

Fortress
Ensylva

HARD FESCUE

Reliant
Sparton

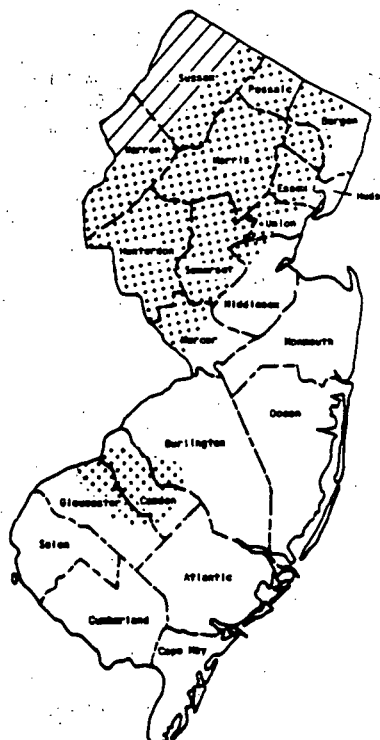
SHEEP FESCUE

Ares

Plant Hardiness Zones

AVERAGE ANNUAL MINIMUM TEMPERATURE (F)

New Jersey



ZONE

5-



-20° to -10°

ZONE

6-



-10° to 0°

ZONE

7-



0° to 10°

USDA - SCS - NJ
CLASSIFICATION OF NEW JERSEY SOIL SERIES
INTO SITE CONDITIONS IMPORTANT TO SEEDING

A = Droughty
B = Well and moderately well drained
C = Somewhat poorly drained
D = Poorly and very poorly drained

Series	Class	Series	Class	Series	Class	Series	Class
Abbottstown	C	Coplay	D	Lamington	C	Pope	B
Adelphia	B	Cossayuna	B	Lansdale	B	Portsmouth	D
Adrian	D	Crestmore	B	Lansdowne	B	Preakness	D
Albia	C	Croton	D	Lawrenceville	B	Quakertown	B
Amwell	C	Culvers	C	Legore	B	Raritan	C
Annandale	B	Donlonton	C	Lehigh	C	Raynham	C
Asbury	B	Downer	B	Lenoir	C	Readington	B
Atherton	D	Doylestown	D	Leon	D	Reaville	C
Athol	B	Dragston	C	Lincroft	A	Rhinebeck	C
Atsion	D	Duffield	B	Livingston	D	Ridgebury	D
Aura	B	Dunellen	B	Lyons	D	Riverhead	B
Barclay	C	Dutchess	B	Marksboro	C	Rockaway	B
Bartley	B	Edneyville	B	Marlton	B	Rockport	B
Bath	B	Elkton	D	Matapeake	B	Roe	C
Bayboro	D	Ellington	B	Matawan	B	Rowland	B
Beatty	B	Evesboro	A	Matlock	D	Royce	B
Bedington	B	Fallsington	D	Mattapex	B	Rutledge	D
Berks	B	Fort Mott	A	Meckesville	B	St. Johns	D
Berryland	D	Fredon	D	Middlebury	B	Sassafras	B
Bertie	C	Freehold	B	Minoa	C	Scio	C
Bibb	D	Freneau	D	Monmouth	B	Shrewsbury	D
Bliddeford	D	Galestown	A	Mount Lucas	B	Sloan	D
Birdsboro	B	Hackettstown	B	Nassau	A	Stephensburg	B
Boonton	B	Haledon	C	Navesink	B	Swartswood	B
Bowmansville	C	Halsey	D	Neshaminy	B	Tinton	A
Boynton	D	Hammonton	B	Netcong	B	Tioga	B
Braceville	B	Hazen	B	Nixon	B	Townsbury	B
Bridgeville	C	Hazleton	B	Nixonton	B	Tunkhannock	B
Bucks	B	Hero	B	Norton	B	Turbotville	C
Burnham	D	Hibernia	C	Norwich	D	Unadilla	B
Califon	B	Holmdel	B	Oquaga	B	Valois	B
Carlisle	D	Holyoke	A	Osier	D	Wallkill	D
Cattaraugus	B	Hoosic	A	Othello	D	Washington	B
Chalfont	C	Howell	B	Otisville	A	Wassalc	B
Chatfield	B	Keansburg	D	Palmyra	B	Watchung	D
Chenango	B	Kendala	D	Parker	A	Wayland	D
Chillum	B	Keyport	B	Parsippany	D	Weeksville	D
Chippewa	C	Kistler	B	Pasquotank	D	Wellsboro	C
Cokesbury	D	Kieij	A	Pattenburg	B	Westphalia	B
Colden	D	Klinesville	A	Pemberton	A	Whippany	C
Colemanstown	D	Kresson	C	Penn	B	Whitman	D
Collington	B	Lackawanna	B	Phelps	C	Woodglen	D
Colonie	A	Lakehurst	A	Plummer	D	Woodmansie	B
Colts Neck	B	Lakeland	A	Pocomoke	D	Woodstown	B
Comly	C	Lakewood	A	Pompton	C	Wooster	B
						Wurtsboro	B

APPENDIX C

J. A. Timothy Francisco

Mr. Francisco has over 10 years experience in the environmental consulting, engineering, and remediation field. He is responsible for conducting environmental audits, industrial hygiene, regulatory compliance, cost estimating, proposal preparation, project management and evaluations. Also responsible for program development of emerging markets and environmental technology, and project management.

Education:

Graduate Studies, M.S. Program in Environmental Health (Ind. Hygiene Conc.), Temple University, 1993
B.S. Degree, Environmental Engineering Technology, Temple University, 1990

General Experience:

1995 to Present	Environmental Engineer, Oxford Environmental, Inc., Pine Brook, New Jersey.
1994 to 1995	Principal, Environmental Engineer/Industrial Hygienist, Aurora Environmental Services, Inc., Ardmore, Pennsylvania. Consulted with industrial, commercial and institutional clients on regulatory facility compliance issues such as emissions, pollution prevention, environmental management systems, and health and safety.
1987 to 1994	Environmental Engineer/Industrial Hygienist, Building Inspector, Asbestos Safety Technician, Environmental Technician, Probe Environmental, Inc., Mount Laurel, New Jersey. Managed and directed environmental audits department. Responsible for overall performance of environmental assessments of industrial, commercial and institutional sites for real estate transactions. Responsible for program development of emerging environmental markets and technology, and project management.

Training/Specialty Certifications:

EAA: Certified Environmental Specialist (CES)/Certified Environmental Inspector (CEI), Cert. No. 11280
EPA AHERA Accredited Building Inspector
EPA Model Training, Lead-Based Paint Inspector
MAP-3 XRF Spectrum Analyzer Operator Training, Scitec Corp.
Maryland Lead Abatement Worker Training
New Jersey Approved Lead Training Instructor:
 Lead Abatement Worker/Supervisor, Inspector, Project Designer Course
New Jersey Certified Asbestos Safety Technician (AST)
New Jersey Underground Storage Tank Guidelines
OSHA 40-Hour Hazardous Waste Operations
OSHA 8-Hour Supervisor Hazardous Waste Operations
Radiation Safety Training, Scitec Corp.
American Board of Industrial Hygiene: Candidate for Certification in Core & Comprehensive Practice

Professional Affiliations:

Air & Waste Management Association (AWMA), 1995
American Industrial Hygiene Association (AIHA), 1994
Environmental Assessment Association (EAA), 1995
Hazardous Materials Control Research Institute, 1993
National Lead Abatement Council (NLAC), 1994

Gary T. Boyer, P.E. DEE

Mr. Boyer is responsible for all engineering designs including engineering studies, reports, designs, inspections and troubleshooting. He also serves as chemist and biologist.

Education:

M.S. Degree, Environmental Engineering, Purdue University, 1977

B.A. Degree, Chemistry and Biology (Double Major), Occidental College, 1975

General Experience:

- 1995 to 1996 Leggette, Brashears and Graham, Inc. - Senior Engineer
Provided engineering support for 120 person groundwater and environmental consulting firm. Consulted, designed and inspected construction of public water supplies from 150 to 800 gpm. Diagnosed problems and recommended solutions for groundwater remediation systems. Consulted regarding industrial wastewater disposal assignments. Evaluated risk based corrective actions for remediation of lead-contaminated site. Wrote SPCC and FRP plans.
- 1989 to 1995 Metcalf and Eddy, Inc. - Project Manager and Technical Specialist
Technical resource in consulting engineering firm with 1400 employees. Used innovative technology to assist senior management to develop new clients. Guided teams on numerous feasibility studies, technology evaluations, bench and pilot scale tests, design, construction and operating projects. Obtained treatment works, soil erosion control and DPCC/DCR plan approvals; water withdrawal, wetlands, stream encroachment, air and water discharge permits, wrote key sections of proposal and made successful presentations.
- 1987 to 1989 Frace and Associates, Inc. - Managing Engineer
Directed site evaluations and designs of septic systems for land development. Provided ECRA services. Provided legal support for wastewater malpractice case.
- 1982 to 1987 Van Note-Harvey Associates, Inc. - Manager, Industrial Services
Developed hazardous waste, solid waste and industrial wastewater practice for municipal and land development engineering firm. Served electronics, rubber, pharmaceutical, food industries. Branched into septic systems to support land development practice.
- 1979 to 1982 Exxon Research and Engineering - Senior Engineer: 1981-1982, Project Engineer: 1979-1981, Engineer: 1977-1979.
Research and development and technical service for water pollution control and hazardous waste management for oil refineries, chemical plants and the synfuels industry.

Professional Registrations/Specialty Certifications

Professional Engineer in the state of New Jersey and New York
Diplomate in Waste Supply/Wastewater Disposal, since 1990, and Hazardous Waste Management, since, 1992, American Academy of Environmental Engineers OSHA Safety at Hazardous Waste Sites.